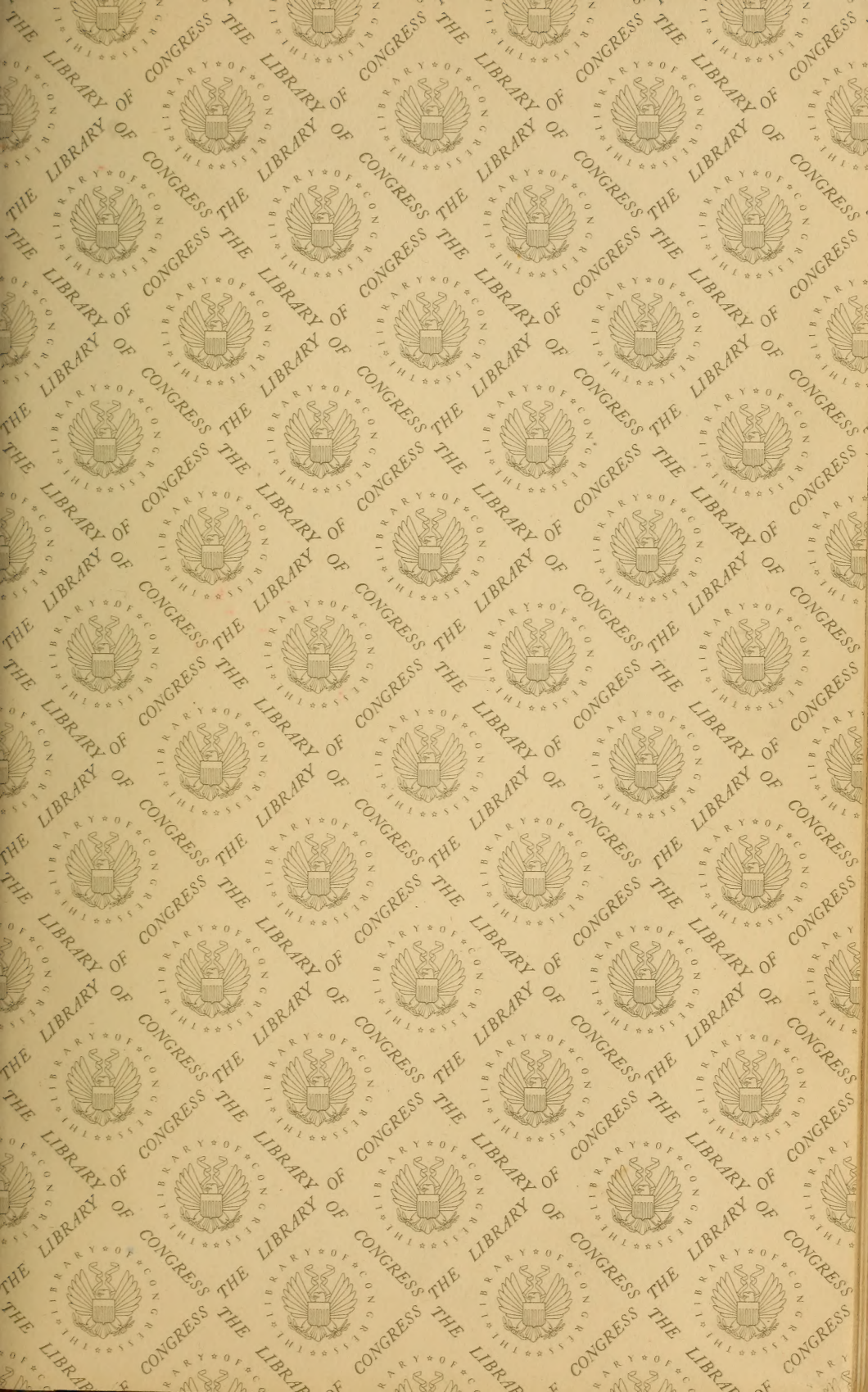






THE
FENNER FORMULARY

INTERNATIONAL DISPENSATORY

COMPREHENSIVE OF MODERN MEDICINE AND
BOTH ON PHARMACY AND
NATURAL MEDICINE
ALREADY PUBLISHED

H. FENNER

FIFTEENTH EDITION, 1914

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P R E F A C E.

The first Fenner's Formulary (which was but a small pamphlet) was issued in 1874, and was a pioneer in a new field of Pharmacy, furnishing the first reliable formulas for the Elixirs and so-called "Elegant Preparations" which were, at that time, in great demand. Thirteen revised editions of this work, greatly enlarged and improved, have followed the original issue, and this,—now called "The Fenner Formulary," is the fifteenth.

The advance in Pharmacy, Chemistry, Medicine and the allied sciences during the past forty years has been phenomenal and the introduction of new drugs, new chemicals and new preparations has been greater during this period than at any former time in the history of Pharmacy. The production (if it may be so termed) of new remedies and chemical combinations and new forms of medicine has so far outrun the text-books extant that there is a great want and demand for a new and comprehensive work that shall represent the requirements of the pharmacy of today, and include all drugs, chemical compounds and preparations now known and employed in medicine. It has been attempted in this work to fulfil these requirements.

The introduction of the metric system of weight and measures in the late revision of the United States and British Pharmacopœias, and their general use throughout other countries necessitates a better understanding of their relation to apothecary and commercial weight and measure in which the formulas of English text-books have heretofore been written. Therefore all the official formulas of the U. S. and G. Br., and many not official are given both in the commercial and metric systems. In this way the dispenser soon becomes familiar with the terms and values of each system and their relation to each other.

The change in chemical nomenclature which was introduced in the seventh revision of the United States Pharmacopœia (1890-1893), and was adopted by the British Pharmacopœia of 1898, has necessitated a complete change in the names of chemicals, by reversing their terms. What was formerly called "Acetate of Potassium" is now termed "Potassium Acetate," and so on throughout the list. Many other changes in nomenclature will also be observed throughout this work.

Pharmacy laws have been enacted in most of the states, making it necessary for those who would engage in the practice of Pharmacy to pass an examination on the subjects of which a knowledge is required. This work presents to students of Pharmacy or those who would pass examinations, excellent facilities to acquire information, as it treats, in a clear and com-

prehensive manner, the entire range of subjects upon which examinations are taken; and the further understanding of them is ably seconded by the information, definitions, etc., which make up the Introductory section of the work, pages 17 to 105.

The introduction of the U. S. Pure Food and Drugs Law of June 30, 1906, and the adoption by most of the states of Pure Food and Drug laws has greatly changed the regulations for putting up, labeling and selling proprietary medicines and foods. The requirements of the U. S. act as to drugs is clearly stated on pages 9 to 16, and throughout this work under the titles of the drugs and preparations to which they apply.

Many retail druggists find it desirable to prepare and sell a line of their own extracts, proprietary medicines, perfumes, toilet requisites, etc., thus deriving an increased profit and much satisfaction. To those and to manufacturers who make such preparations for the trade, the formulas and suggestions in Parts III, and IV, will be found of special interest and value. All who have soda fountains will find in Part V, much information regarding the preparations required in that department. Others may be interested in the subjects considered in part VI., in which may be found many valuable formulas for wines, liquors, compounds and cordials; and others may find in Part VII. many formulas for miscellaneous preparations much used in the drug and allied trades.

In submitting this work to those who may become its possessors the author desires to say that it has been his earnest endeavor to prepare a volume which will be an everyday companion to those who are engaged in such vocations as it subjects will interest. It is intended for the workshop or laboratory and as a reference book for the physician and the student of pharmacy or medicine. It is sincerely hoped that it may contribute something of pleasure and benefit to those into whose hands it may fall.

Westfield, New York, August 15, 1912.

CONTENTS.

INTRODUCTORY.

Pages 7-105.

Introductory, General Plan of the Work,	7-8
Pure Food and Drugs Act and Regulations,	9-16
Abbreviations, Signs and References,	17-23
Prefixes Used in Pharmacy and Medicine,	23-28
Suffixes and Terminations Used in Pharmacy and Medicine,	29-30
Medical, Pharmaceutical and Chemical Terms,	31-56
Weights and Measures,	57-68
Specific Weight or Gravity,	69-80
Heat Measures and Thermometry,	77-80.
Working Processes of Pharmacy and Chemistry,	81-105

PART I.

Drugs and Medicinal Substances.

Pages 106-326.

Organic Materia Medica,	106-236
Botany,	107-119
Vegetable Drugs,	110-112
Animal Drugs,	112-114
Organic Materia Medica—Vegetable and Animal Drugs,	114-236
Chemical Elements and Compounds,	237-326
Chemistry,	237-239
Table of Atomic Weights,	239
Periodic Arrangement of the Elements,	240
The Periodic System,	241-242
Minerals, Metals and Not-Metals,	243-244
Densities, Melting and Boiling Points,	244-245
The Chemical Elements and their Compounds,	246-326

PART II.

Drugs, Chemicals and Preparations.

Working Formulæ.

Pages 327-1136.

This part includes all chemical and pharmaceutical preparations official in the U. S. and Br. Pharmacopœias, and all vegetable and animal drugs for which assay processes are given in the U. S. P. Also the more important preparations official in other countries and the unofficial preparations generally used, or having commercial recognition, together with such other preparations as are generally known and used in the regular practice of pharmacy in this and other countries.

PART III.

Standard Remedies and Proprietary Medicines.

Pages 1137-1264.

In this part formulas are given for a complete line of Standard Remedies which may be put up as proprietary medicines. They are classified generally, under the names of the diseases or complaints for which they are designed, as "Ague Cures," "Asthma Remedies," "Cathartics," "Cough Remedies," etc., or under the medicinal or pharmaceutical name of a class to which they belong, as "Balms," "Balsams," "Bitters," etc.

PART IV.

Toilet Preparations and Perfumes.

Pages 1265-1314.

This part includes all manner of Toilet Preparations and Perfumes, Preparations for the hair, face, skin, teeth etc. Perfumes, both natural and synthetic, Sachet Powders, Toilet Soaps, Vinegars and Waters.

PART V.

Flavoring Extracts, Soda Water Requisites, Confectionery, Etc.

Pages 1315-1354.

In this part formulas are given for all kinds of Flavoring Extracts, a complete line of requisites for Soda Water, Confectionery and Chewing Gums.

PART VI.

Spiritous Liquors, Wines and Cordials.

Pages 1355-1372.

This part describes the methods for making and compounding Spiritous Liquors, Wines and Cordials, with formulas for extracts, bitters, cocktails, and all manner of preparations required in this line.

PART VII.

Miscellaneous.

Pages 1373-1401.

In this part formulas are given for many preparations not properly classified in the preceding sections, but frequently required in the drug and allied vocations.

INDEX.

Pages 1403-1480.

INTRODUCTORY.

The matter contained in this volume is designed for study, information, convenient reference, and for use in the office or laboratory; and is intended to be so arranged as best to serve these purposes.

For the student the Introductory section will be of value in familiarizing himself with the preliminaries that are necessary to the understanding of pharmacy, chemistry and medicine. This section will also be found very convenient for reference by all who have this work.

The physician will be interested in the composition, properties and medicinal action and doses of the chemicals, medicines and preparations throughout the work.

The manufacturer may find suggestions and information of interest in the department of the work which corresponds with the line of products he prepares.

The pharmacist will have continual use for the entire volume, either as a reference or as a formulary for the making of all manner of medicines and preparations required in the complex business of pharmacy of the present day.

In the Introductory section are included Abbreviations, Signs, Symbols, Prefixes, Suffixes and Terminations used in medicine and pharmacy, and a dictionary of Medical, Chemical and Pharmaceutical Terms valuable for information and reference. Also Weights and Measures, Specific Weight or Gravity and Heat Measures to which frequent reference is required. Following these is a section on the Working Processes of Chemistry and Pharmacy which contains much practical information for all those who engage in drug or chemical pursuits.

In Part I. the substances used in medicine, both organic and chemical, are briefly considered and described.

In Part II., which constitutes the greater part of the volume, the working formulas employed in the art and practice of pharmacy and chemistry are given. These are classified as far as is practicable, according to their pharmaceutical similarity or their chemical bases or radicals, and are alphabetically arranged from A to Z.

In this section the official preparations are designated by their Latin titles, as given in the pharmacopœias, followed by the common name or names by which they are generally known. Preparations not official are usually designated by their trade, or English pharmaceutical names.

Weights and Measures, both of the commercial and metric systems are given in the U. S. and Br. official formulas; and temperature, when given, is expressed in both the Centigrade and Fahrenheit scale.

In formulas other than those official the ordinary commercial weight and fluid measure in use in the U. S. are usually given.

As this work is intended more particularly as a formulary, the description of pharmaceutical apparatus in general use, and of crude medicinal substances are much condensed, and for the same reason the tests of chemicals etc. are not generally given.

Part III. includes formulas for standard proprietary medicines, which are classed, chiefly, according to their medicinal uses, as Ague Cures, Catarrh Remedies, Cough Preparations etc. This department will be found of much value to manufacturers of proprietary medicines or to others who wish to prepare remedies of this nature.

In Part IV. formulas for toilet preparations and perfumes are arranged as nearly as possible according to their uses; as Hair Preparations, Lotions, Perfumes etc.

Part V. is devoted to Flavoring Extracts and various requisites for the soda water business, which forms an important part of the business of many drug stores. Confectionery and chewing gum are included in this department.

Part VI. In this part liquors, wines and cordials and the articles connected with this class of trade are considered.

Part. VII. This part contains formulas for a considerable number of miscellaneous preparations that could not well be classified in other departments of the work.

In preparing the formulas, where both the metric and commercial weight or measure are directed, follow either the one or the other entirely; that is —if you use the metric, use it all through the formula, and if you use the commercial weight or measure use it all through. The weight and measure indicated in the various systems are not necessarily equivalent, but only proportionate; for example, a formula reads:

—	—	—	—	10 grammes	or	1 ounce av.
—	—	—	—	100 cubic centimeters	or	10 fl.ounces

It does not mean that 10 grammes = 1 ounce, nor that 100 Cc.= 10 fl.ounces. Follow either the one or the other system and the proportion is the same.

THE FOOD AND DRUGS ACT, JUNE 30, 1906.

The following extracts taken from the Pure Food and Drugs Act are of particular interest to pharmacists and those engaged in manufacturing pharmaceutical and chemical products:

AN ACT For preventing the manufacture, sale, or transportation of adulterated or misbranded or poisonous or deleterious foods, drugs, medicines, and liquors, and for regulating the traffic therein, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United State of America in Congress assembled, That it shall be unlawful for any person to manufacture within any Territory or the District of Columbia any articles of food or drug which is adulterated or misbranded, within the meaning of this Act, and any person who shall violate any of the provisions of this section shall be guilty of a misdemeanor, and for each offense shall, upon conviction thereof, be fined not to exceed five hundred dollars or shall be sentenced to one year's imprisonment, or both such fine and imprisonment, in the discretion of the court, and for each subsequent offense and conviction thereof shall be fined not less than one thousand dollars or sentenced to one year's imprisonment, or both such fine and imprisonment, in the discretion of the court.

Sec. 2. That the introduction into any State or Territory or in the District of Columbia from any other State or Territory or the District of Columbia, or from any foreign country, or shipment to any foreign country of any article of food or drugs which is adulterated or misbranded, within the meaning of this Act, is hereby prohibited; and any person who shall ship or deliver for shipment from any State or Territory or the District of Columbia to any other State or Territory or the District of Columbia, or to a foreign country, or who shall receive in any State or Territory or the District of Columbia from any other State or Territory or the District of Columbia, or foreign country, and having so received, shall deliver, in original unbroken packages, for pay or otherwise, or offer to deliver to any other person, any such article so adulterated or misbranded within the meaning of this Act, or any person who shall sell or offer for sale in the District of Columbia or the Territories of the United States any such adulterated or misbranded food or drugs, or export or offer to export the same to any foreign country, shall be guilty of a misdemeanor, and for such offense be fined not exceeding two hundred dollars for the first offense, and upon conviction for each subsequent offense not exceeding three hundred dollars or be imprisoned not exceeding one year, or both, in the discretion of the court. Provided, That no article shall be deemed misbranded or adulterated within the provisions of this Act when intended for export to any foreign country and prepared or packed according to the specifications or directions of the foreign purchaser when no substance is used in the preparation or packing thereof in conflict with the laws of the foreign country to which said article is intended to be shipped, but if said article shall be in fact sold or offered for sale for domestic use or consumption, then this proviso shall not exempt said article from the operation of any of the other provisions of this Act.

Sec. 3. That the Secretary of the Treasury, the Secretary of Agriculture, and the Secretary of Commerce and Labor shall make uniform rules and regulations for carrying out the provisions of this Act, including the collection and examination of specimens of foods and drugs manufactured or offered for sale in the District of Columbia, or in any Territory of the United States, or which shall be offered for sale in unbroken packages in any State other than that in which they shall have been respectively manufactured or produced, or which shall be received from any foreign country, or intended for shipment to any foreign country, or which may be submitted for examination by the chief health, food, or drug officer of any State, Territory, or the District of Columbia, or at any domestic or foreign port through which such product is offered for interstate commerce, or for export or import between the United States and any foreign port or country.

Sec. 4. That the examination of specimens of food and drugs shall be made in the Bureau of Chemistry of the Department of Agriculture, or under the direction and supervision of such Bureau, for the purpose of determining from such examinations whether such articles are adulterated or misbranded within the meaning of this Act; and if it shall appear from any such examination that any of such specimens is adulterated or misbranded within the meaning of this Act, the Secretary of Agriculture shall cause notice to be given to the party from whom such sample was obtained. Any party so notified shall be given an opportunity to be heard, under such rules and regulations as may be prescribed as aforesaid, and if it appears that any of the provisions of this Act have been violated by such party, then the Secretary of Agriculture shall at once certify the facts to the proper United States district attorney, with a copy of the results of the analysis or the examination of such article duly authenticated by the analyst or officer making such examination, under the oath of such officer. After judgment of the court, notice shall be given by publication in such manner as may be prescribed by the rules and regulations aforesaid.

Sec. 5. That it shall be the duty of each district attorney to whom the Secretary of Agriculture shall report any violation of this Act, or to whom any health or food or drug officer or agent of any State, Territory, or the District of Columbia shall present satisfactory evidence of any such violation, to cause appropriate proceedings to be commenced and prosecuted in the proper courts of the United States, without delay, for the enforcement of the penalties as in such case herein provided.

Sec. 6. That the term "drug" as used in this Act, shall include all medicines and preparations recognized in the United States Pharmacopœia or National Formulary for internal or external use, and any substance or mixture of substances intended to be used for the cure, mitigation, or prevention of disease of either man or animals. The term "food," as used herein, shall include all articles used for food, drink, confectionery, or condiment by man or other animals, whether simple, mixed, or compound.

Sec. 7. That for the purposes of this Act an article shall be deemed to be adulterated:

In case of drugs:

First. If, when a drug is sold under or by a name recognized in the United States Pharmacopœia or National Formulary, it differs from the standard of strength, quality, or purity, as determined by the test laid down in the United States Pharmacopœia or National Formulary official at the time of investigation: Provided, That no drug defined in the United States Pharmacopœia or National Formulary shall be deemed to be adulterated under this provision if the standard of strength, quality, or purity be plainly stated upon the bottle, box, or other container thereof although the standard may differ from that determined by the test laid down in the United States Pharmacopœia or National Formulary.

Second. If its strength or purity fall below the professed standard or quality under which it is sold.

In the case of confectionery:

If it contain terra alba, barytes, talc, chrome yellow, or other mineral substance or poisonous color or flavor, or other ingredient deleterious or detrimental to health, or any vinous, malt or spiritous liquor or compound or narcotic drug.

In the case of food:

First. If any substance has been mixed and packed with it so as to reduce or lower or injuriously affect its quality or strength.

Second. If any substance has been substituted wholly or in part for the article.

Third. If any valuable constituent of the article has been wholly or in part abstracted.

Fourth. If it be mixed, colored, powdered, coated, or stained in a manner whereby damage or inferiority is concealed.

Fifth. If it contain any added poisonous or other added deleterious ingredient which may render such article injurious to health: Provided, That when

in the preparation of food products for shipment they are preserved by any external application applied in such manner that the preservative is necessarily removed mechanically, or by maceration in water, or otherwise, and directions for the removal of said preservative shall be printed on the covering or the package, the provisions of this Act shall be construed as applying only when said products are ready for consumption.

Sixth. If it consists in whole or in part of a filthy, decomposed, or putrid animal or vegetable substance, or any portion of an animal unfit for food, whether manufactured or not, or if it is the product of a diseased animal, or one that has died otherwise than by slaughter.

Sec. 8. That the term "misbranded," as used herein, shall apply to all drugs, or articles of food, or articles which enter into the composition of food, the package or label of which shall bear any statement, design or device regarding such article, or the ingredients or substances contained therein which shall be false or misleading in any particular, and to any food or drug product which is falsely branded as to the State, Territory, or country in which it is manufactured or produced.

That for the purposes of this Act an article shall also be deemed misbranded:

In case of drugs:

First. If it be an imitation of or offered for sale under the name of another article.

Second. If the contents of the package as originally put up shall have been removed in whole or in part, and other contents shall have been placed in such package, or if the package fail to bear a statement on the label of the quantity or proportion of any alcohol, morphine, opium, cocaine, heroin, alpha or beta eucaine, chloroform, cannabis indica, chloral hydrate, or acetanilide, or any derivative of any such substances contained therein.

In the case of food:

First. If it be an imitation of or offered for sale under the distinctive name of another article.

Second. If it be labeled or branded so as to deceive or mislead the purchaser, or purport to be a foreign product when not so, or if the contents of the package as originally put up have been removed in whole or in part, and other contents shall have been placed in such package, or if it fail to bear a statement on the label of the quantity or proportion of any morphine, opium, cocaine, heroin, alpha or beta eucaine, chloroform, cannabis indica, chloral hydrate, or acetanilide, or any derivative or preparation of any of such substances contained therein.

Third. If in package form, and the contents are stated in terms of weight or measure, they are not plainly and correctly stated on the outside of the package.

Fourth. If the package containing it or its label shall bear any statement, design, or device, regarding the ingredients or the substances contained therein, which statement, design, or device, shall be false or misleading in any particular: Provided, That an article of food which does not contain any added poisonous or deleterious ingredients shall not be deemed to be adulterated or misbranded in the following cases:

First. In the case of mixtures or compounds which may be now or from time to time hereafter known as articles of food, under their own distinctive names, and not an imitation of or offered for sale under the distinctive name of another article, if the name be accompanied on the label or brand with a statement of the place where said article has been manufactured or produced.

Second. In the case of articles labeled, branded, or tagged so as to plainly indicate that they are compounds, imitations, or blends, and the word "compound," "imitation," or "blend," as the case may be, is plainly stated on the package in which it is offered for sale: Provided, That the term blend as used herein shall be construed to mean a mixture of like substances, not excluding harmless coloring or flavoring ingredients used for the purpose of coloring and flavoring only: And provided further, That nothing in this Act shall be construed as requiring or compelling proprietors or manufacturers of proprietary foods which contain no unwholesome added ingredient to dis-

close their trade formulas, except in so far as the provisions of this Act may require to secure freedom from adulterating or misbranding.

Sec. 9. That no dealer shall be prosecuted under the provisions of this Act when he can establish a guaranty signed by the wholesaler, jobber, manufacturer, or other party residing in the United States, from whom he purchases such articles, to the effect that the same is not adulterated or misbranded within the meaning of this Act, designating it. Said guaranty, to afford protection, shall contain the name and address of the party or parties making the sale of such article to such dealer, and in such case said party or parties shall be amenable to the prosecutions, fines, and other penalties which would attach, in due course, to the dealer under the provisions of this Act.

Sec. 10. This section relates to the seizure and disposal of adulterated or misbranded foods, drugs or liquors.

Sec. 11. This section relates to the gathering of samples of foods and drugs imported into the United States and their disposal if found adulterated or misbranded.

Sec. 12. Defines the term "Territory" as used in the Act, to include the insular possessions of the United States; and the term "person" to include individuals, companies, corporations, societies and associations.

The following Regulations which are pertinent to this act as it applies to drugs are given:

Regulation 28. Substances named in Drugs or Foods.

(Section 8. Second under "Drugs," second under "Foods.")

(a) The term "alcohol" is defined to mean common or ethyl alcohol. No other kind of alcohol is permissible in the manufacture of drugs except as specified in the United States Pharmacopœia or National Formulary.

(b) The words alcohol, morphine, opium, etc., and the quantities and proportions thereof, shall be printed in letters corresponding in size with those prescribed in Regulation 17, paragraph (c).

(c) A drug or food product except in respect of alcohol, is misbranded in case it fails to bear a statement on the label of the quantity or proportion of any alcohol, morphine, opium, heroin, cocaine, alpha or beta eucaine, chloroform, cannabis indica, chloral hydrate, or acetanilide, or any derivative or preparation of any such substances contained therein.

(d) A statement of the maximum quantity or proportion of any such substances present will meet the requirements, provided the maximum stated does not vary materially from the average quantity or proportion.

(e) In case the actual quantity or proportion is stated it shall be the average quantity or proportion with the variations noted in Regulation 29.

(f) The following are the principle derivatives and preparations made from the articles which are required to be named on the label:

Alcohol, Ethyl: (Cologne spirits, Grain alcohol, Rectified spirits, Spirits, and Spirits of wine.)

Derivatives—

Aldehyde, Ether, Ethyl acetate, Ethyl nitrite and Paraldehyde.

Preparations containing alcohol—

Bitters, Brandies, Cordials, Elixirs, Essences, Fluidextracts, Spirits, Sirups, Tinctures, Tonics, Whiskies, and Wines.

Morphine Alkaloid:

Derivatives—

Apomorphine, Dionine, Peronine, Morphine acetate, Hydrochloride, Sulphate, and other salts of morphine.

Preparations containing morphine or derivatives of morphine—

Bougies, Catarrh Snuff, Chlorodyne, Compound powder of morphine, Crayons, Granules, Pills, Solutions, Sirups, Suppositories, Tablets, Triturates, and Troches.

Opium, Gum:

Preparations of Opium—

Extracts, Denarcotized opium, Granulated opium, and Powdered opium, Bougies, Brown mixture, Carminative mixtures, Crayons, Dover's powder, Elixirs, Liniments, Ointments, Paregoric, Pills, Plasters Sirups, Suppositories, Tablets, Tinctures, Troches, Vinegars, and Wines.

Derivatives—

Codeine, Alkaloid, Hydrochloride, Phosphate, Sulphate, and other salts of codeine.

Preparations containing codeine or its salts—

Elixirs, Pills, Sirups, and Tablets.

Cocaine, Alkaloid:

Derivatives—

Cocaine hydrochloride, Oleate, and other salts.

Preparations containing cocaine or salts of cocaine—

Coca leaves, Catarrh powders, Elixirs, Extracts, Infusion of coca, Ointments, Paste pencils, Pills, Solutions, Sirups, Tablets, Tinctures, Troches, and Wines.

Heroin:

Preparations containing heroin—

Sirups, Elixirs, Pills, and Tablets.

Alpha and Beta Eucaïne:

Preparations—

Mixtures, Ointments, Powders, and Solutions.

Chloroform:

Chloranodyne, Elixirs, Emulsions, Liniments, Mixtures, Spirits, and Sirups.

Cannabis Indica:

Preparations of cannabis indica—

Corn remedies, Extracts, Mixtures, Pills, Powders, Tablets, and Tinctures.

Chloral Hydrate (Chloral, U. S. Pharmacopœia, 1890):

Derivatives—

Chloral acetophenonoxim, Chloral alcoholate, Chloralamide, Chloralimide, Chloral orthoform, Chloralose, Dormiol, Hypnal, and Uraline.

Preparations containing chloral hydrate or its derivatives—

Chloral camphorate, Elixirs, Liniments, Mixtures, Ointments, Suppositories, Sirups, and Tablets.

Acetanilide (Antifebrine, Phenylacetamide):

Derivatives:

Acetphenetidine, Citrophen, Diacetanilide, Lactophenin, Methoxy-acetanilide, Methylacetanilide, Para-Iodoacetanilide, and Phenacetine.

Preparations containing acetanilide or derivatives—

Analgesics, Antineuralgics, Antirheumatics, Cachets, Capsules, Cold remedies, Elixirs, Granular effervescent salts, Headache powders, Mixtures, Pain remedies, Pills, and Tablets.

(g) In declaring the quantity or proportion of any of the specified substances the names by which they are designated in the act shall be used, and in declaring the quantity or proportion of derivatives of any of the specified substances, in addition to the trade name of the derivative, the name of the specified substance shall also be stated, so as to indicate clearly that the product is a derivative of the particular specified substance.

Regulation 7. Standards for Drugs.

(a) A drug bearing a name recognized in the United States Pharmacopœia or National Formulary, without any further statement respecting its character, shall be required to conform in strength, quality, and purity to the standards prescribed or indicated for a drug of the same name recognized in the United States Pharmacopœia or National Formulary, official at the time.

(b) A drug bearing a name recognized in the United States Pharmacopœia or National Formulary, and branded to show a different standard of strength, quality, or purity, shall not be regarded as adulterated if it conforms to its declared standard.

Regulation 15. Wholesomeness of Colors and Preservatives.

(Section 7, paragraph 5, under "Foods.")

(a) Respecting the wholesomeness of colors, preservatives, and other substances which are added to foods, the Secretary of Agriculture shall determine from chemical or other examination, under the authority of the agricultural appropriation act, Public 382, approved June 30, 1906, the names of those substances which are permitted or inhibited in food products; and such findings, when approved by the Secretary of the Treasury and the Secretary of Commerce and Labor, shall become a part of these regulations.

(b) The Secretary of Agriculture shall determine from time to time, in accordance with authority conferred by the agricultural appropriation act, Public 382, approved June 30, 1906, the principles which shall guide the use of colors, preservatives, and other substances added to foods; and when concurred in by the Secretary of the Treasury and the Secretary of Commerce and Labor, the principles so established shall become a part of these regulations.

A circular has recently been issued by the Department of Agriculture, naming the coal tar colors permissible for coloring foods, drugs and confectionery. See page 1899.

(c) It having been determined that benzoate of soda mixed with food is not deleterious or poisonous and is not injurious to health, no objection will be raised under the food and drugs act to the use in food of benzoate of soda, provided that each container or package of such food is plainly labeled to show the presence and amount of benzoate of soda. Food Inspection Decisions 76 and 89 are amended accordingly.

MISBRANDING.

Regulation 17. Label.

(a) The term "label" applies to any printed, pictorial or other matter upon or attached to any package of food or drug product, or any container thereof subject to the provisions of this act.

(b) The principal label shall consist, first, of all information which the food and drugs act, June 30, 1906, specifically requires, to wit, the name of the place of manufacture in the case of food compounds or mixtures sold under a distinctive name; statements which show that the articles are compounds, mixtures, or blends; the words "compound," "mixture," or "blend," and words designating substances of their derivatives and proportions required to be named in the case of foods and drugs. All this information shall appear upon the principal label, and should have no intervening descriptive or explanatory reading matter. Second, if the name of the manufacturer and place of manufacture are given, they should also appear upon the principal label. Third, preferably upon the principal label, in conjunction with the name of the substance, such phrases as "artificially colored," "colored with sulphate of copper," or any other such descriptive phrases necessary to be announced should be conspicuously displayed. Fourth, elsewhere upon the principal label other matter may appear in the discretion of the manufacturer. If the contents are stated in terms of weight or measure, such statement should appear upon the principal label and must be couched in plain terms, as required by Regulation 29.

(c) If the principal label is in a foreign language, all information required by law and such other information as indicated above in (b) shall appear upon it in English. Besides the principal label in the language of the country of production, there may be also one or more other labels, if desired, in other languages, but none of them more prominent than the principal label, and these other labels must bear the information required by law, but not necessarily in English. The size of the type used to declare the information required by

the act shall not be smaller than 8-point (brevier) capitals. Provided, That in case the size of the package will not permit the use of 8-point type, the size of the type may be reduced proportionately.

(d) Descriptive matter upon the label shall be free from any statement, design, or device regarding the article or the ingredients or substances contained therein, or quality thereof, or place of origin, which is false or misleading in any particular. The term "design" or "device" applies to pictorial matter of every description, and to abbreviations, characters, or signs for weights, measures, or names of substances.

(e) An article containing more than one food product or active medicinal agent is misbranded if named after a single constituent.

In the case of drugs the nomenclature employed by the United States Pharmacopœia and the National Formulary shall obtain.

(f) The use of any false or misleading statement, design, or device appearing on any part of the label shall not be justified by any statement given as the opinion of an expert or other person, nor by any descriptive matter explaining the use of the false or misleading statement given as the opinion of an expert or other person, nor by any descriptive matter explaining the use of the false or misleading statement, design, or device.

The following explanations and requirements are quoted from a pamphlet issued by the Secretary of Agriculture in response to inquiries as to what is permissible:

The food and drugs act, June 30, 1906, does not require the formula of drug products to be given on the label, but requires only that the quantity or proportion of the ingredients enumerated in the law, and derivatives and preparations of same (Regulation 28), shall be clearly set forth on the label or labels of all preparations used for the treatment or prevention of disease, either internally or externally, for man or other animals. This includes sample packages as well as regular trade packages.

The law is specific on the subject of declaring the amount of alcohol present in medicinal agents, as can readily be seen from the following language: 'An article shall also be deemed misbranded * * * if the package fail to bear a statement on the label of the quantity or proportion of any alcohol * * * contained therein.' No medicinal preparations are exempt, whether they are made according to formulæ given in the U. S. Pharmacopœia or National Formulary or formulæ taken from any other source. The serial number, with or without the guarantee legend, does not exempt a preparation from this requirement. The law does not make any statement as to the amount of alcohol that may or may not be employed. It requires, however, that whatever amount be present shall be set forth on the label. The percentage of alcohol given on the label should be the percentage of absolute alcohol by volume contained in the finished product.

The names to be employed in stating the quantity or proportion of the ingredients required by the act to appear on the label of all medicinal preparations containing the same are—

First. Those used in the law for the articles enumerated; example, "alcohol," not "spiritus rectificatus."

Second. In the case of derivatives: (a) The name of the parent substance used in the act should constitute part of the name; example, "chloral acetone," not "trichlorethidene dimethyl ketone." (b) The trade name, accompanied in parentheses by the name of the parent substance; example, "dionine (morphine derivative)."

Third. Names of preparations containing the name of some ingredient used in the act. In such cases the name used in the act should constitute the first portion of the name of the preparation.

Fourth. Common names (such as laudanum, Dover's powder, etc.) of preparations containing an ingredient enumerated in the law, provided such name or names are accompanied in parentheses by some such phrase as "preparation

of opium" or "opium preparation," followed by the number of minims or grains, as specified in the regulations, for instance, "laudanum (preparation of opium), 40 minims per ounce."

The ounce shall be the unit. The amounts of the ingredients present (excepting alcohol, which is to be stated in per cent.) shall be given in grains or minims, and if it is desired the metric equivalent may be given in addition.

Food mixtures and compounds having "distinctive names" must in all cases bear the name of the place of manufacture. No drug products, whether simple, mixed, or compounded, with or without "distinctive names," are required to bear the name of the manufacturer or producer, or the place where manufactured or produced, except when sold under proper name brands—i. e., brands in which both the given name and the surname are used. All food and drug products sold under such proper name brands should bear the name of the manufacturer of producer and the place of manufacture or production. In all cases where the name of party or place is stated upon the label such name must be the true name of the place where the article was manufactured, produced, or packed.

If, for trade reasons, when not required by law, a name or a place be given upon the label of foods or drugs manufactured or packed for any person, firm, or corporation by another person, firm, or corporation, one of two forms of label is allowed, viz:

(a) The name of the actual manufacturer or packer and the place where the goods were actually manufactured or packed may be given; or

(b) The name of the person, firm, or corporation for whom the goods are manufactured or packed or by whom they are distributed may be given, if preceded by the words "Prepared for," "Manufactured for," "Distributed by," etc. The phrase "Sold by" is not satisfactory. The approved phrase shall be set in type not smaller than eight-point (brevier) caps.

Foods and drugs repacked within a state and sold only within that state are not subject to the federal law; but repacked foods or drugs which enter interstate commerce or which are sold in the District of Columbia or in the Territories are subject to the law and should be labeled in accordance with this decision.

In section 6 of the food and drugs act of June 30, 1906, the term "drug" as defined in the act, includes "all medicinal preparations recognized in the United States Pharmacopœia or National Formulary for internal or external use and any substance or mixture of substances intended to be used for the cure, mitigation, or prevention of disease in either man or other animals.

ABBREVIATIONS AND SIGNS

PREFIXES, SUFFIXES AND TERMINATIONS

USED IN PHARMACY AND MEDICINE.

The following Abbreviations are in general use in Pharmacy and Medicine, and in writing formulas and prescriptions:

a. (Gr. alpha) used to designate the first of a series of compounds; as *a-naphtol*.

āa (Gr. ana), of each. Used in formulas and prescriptions to denote that equal parts or quantities shall be taken.

abs. Absolute; as *abs. alc.*, absolute alcohol; *abs. temp.*, absolute temperature etc.

A. D. (L. Anno Domini), In the year of our Lord.

ad. or **add.** (L. adde), add to, or make up to; as *aquæ ad. f̄jiv*; Water to make (upto) 4 fl.ounces.

ad. The L. preposition, meaning at, to, in, according to; used before abbreviated L. words; as *ad. fin.*, (ad finum), at or to the end; *ad. init.*, (ad initium), at first, at the beginning; *ad int.*, (ad interim), in the meantime; *ad lib.*, (ad libitum), at pleasure, as you please, to the desired quantity; *ad val.*, (ad valorum), according to value.

admov. (L. admoveatur), let it be applied.

alc. Alcohol; as *abs. alc.*, absolute alcohol; *dil. alc.*, diluted alcohol.

alt. Alternate, alternately, every other time.

alt. dieb. (L. alterius diebus), every other day.

alt. hor. (L. alterius horis), every other hour.

A. M. or **a. m.** (L. Ante Meridiem), before meridian, before noon.

amt. Amount, quantity.

Anon. Anonymous; referring to unknown author or authority.

apoth. Apothecary or apothecarius; as *apoth. wt.*, apothecaries' weight; *apoth. meas.*, apothecaries' measure, etc.

appt. Apparent; as *appt. sp. gr.*, apparent specific gravity, *appt. temp.*, apparent temperature.

aq. (L. aqua), water; **aq. bull.** (aqua bulliens), boiling water; **aq. com.** (aqua communis) common water; **aq. dest.** (aqua destillata), distilled water; **aq. ferv.** (aqua fervens), hot water; **aq. fluv.** (aqua fluvialis); river water; **aq. font.** (aqua fontana), fountain water, spring water; **aq. pluv.** (aqua pluvialis), rain water.

anal. Analysis, analyst, analytical.

anat. Anatomy, the science of anatomy.

at. wt. Atomic weight, the combining weight of atoms.

av. Avoirdupois, used in this work as abbreviation for avoirdupois weight; as 2 ounces av.

av. wt. Avoirdupois weight, abbreviation used in many works.

B., Bé. Baumé, Baumé's hydrometer scale; as 20°B. or Bé (meaning Baumé's scale).

β. (Gr. beta), used to designate the second of a series or compound; as *β-naphtol*.

B. A. or **B. S.** (L. balneum arena), sand bath, Bain de Sable Fr.; also **B. A.** (L. balneum aqua), a water-bath.

B. M. (L. balneum mariæ), hot water bath. Bain Marie Fr. The abbreviation is generally used for hot-water-bath, but is more properly for sea water-bath.

B. V. (L. balneum vaporis), vapor bath, steam bath, Bain de Vapeur, Fr.

- bals.** (L. balsamum), balsam.
bib. (L. bibe), drink or drink it.
Biol. Biology. The science of animal organisms.
b.i.d. (L. bis in dies), twice daily.
bol. (L. bolus), a large pill.
bulb. (L. bulbosus), bulb.
bull. (L. bulliat), let it boil.
Bot. Botany. The science of vegetable organisms.
C. (L. congius), a gallon; also Celsius and
C. Centigrade, the centigrade thermometer scale, as 15°C.
C.c. Cubic centimeter or centimeters, also written c.c. and Cc.
cap. (L. capiat), let him take.
chem. Chemist, chemical, chemistry, the science of chemical symbols, see list of chemical elements.
cm. Centimeter.
c.m. (L. cras mane), tomorrow morning.
c.m.s. (L. cras mane sumendus), to be taken tomorrow morning.
c.n. (L. cras nocte), tomorrow night.
coch. (L. cochleare), a spoon, a spoonful.
coch. ampl. (L. cochleare amplum), a tablespoonful.
coch. mag. (L. cochleare magnum), a large spoonful.
coch. med. (L. cochleare medium), a dessertspoonful.
coch. parv. (L. cochleare parvum), a teaspoonful.
col. (L. cola), strain; (colatus) strained.
colet. (L. colatur), let it be strained.
comp. (L. compositus), compound, (comps.), composition.
collyr. (L. collyrium), an eye wash, eye water.
conc. Concentrate, concentrated.
cong., C. (L. congius), a gallon.
cont. Contents; also (L. contunde), contuse, bruise.
contin. (L. continatur), let it be continued.
coq. (L. coque), cook.
coq. (L. coquantur), boil, let it be boiled.
cort. (L. cortex), bark.
cor. Correction; as cor. for 0.1 p. c. correction for 0.1 percent., cor. sp. gr. for 1 p. c. etc.
crast. (L. crastinus), for tomorrow.
cuj. (L. cujus), of which.
cwt. Hundredweight.
cyath. (L. cyathus), a glassful.
Cyc. Cyclopedia.
D. (L. dosis), dose.
de d. in de. (L. de die in diem), from day to day.
dec. (L. decanta), decant.
decid. Deciduous.
decub. (L. decubitus), lying down.
deg., °. Degree.
dest. (L. destilla), distill.
det. (L. detur), let it be given.
dieb. alt. (L. diebus alternis), on alternate days.
dieb. tert. (Lat diebus tertius), every third day.
dif. Difference; as dif. in vol., difference in volume.
dig. (L. digeratur), digest.
dil. (L. dilue), let it be diluted.
dilut. (L. dilutus), dilute.
dim. (L. dimidius), one-half.
dist. (L. distilla or destilla), or
dest. distil; also destillata, distilled.
div. (L. divide), divide.
d. in p. æq. (L. divide in partes æquales), divide into equal parts.
D. P. (L. directione propria), with a proper direction.
dr. (L. drachma), 3, drachm, $\frac{1}{8}$ of the troy or apothecary ounce; sometimes written dch., drmm., dchm., dram. Example: Tincture opii f3ij (2 fl.drachms).
decoct. (L. decoctum), decoction.
Dent. Dentist, (in Bot. dentate).
Disp. Dispensatory.
Dict. Dictionary.
do. Ditto, the same again.
doz. Dozen, dozens, the same, either sing. or pl.
Dr. Doctor, M. D., a physician.
d. t. Delirium tremens.
dwt. A pennyweight, (24 grains).
Dyn. Dynamics. The science of moving forces.
D. D. S. Doctor of dental surgery.
Ed. Edition or editor.
ed. (L. edulcora), sweeten.
e. g. (L. exempla gracia), for example.
ejusd. (L. ejusdem), of the same.
elect. (L. electuarium), an electuary, electricity, electric.
enem. (L. enema), a clyster, an enema.
e. o. d. Every other day.
etc. (L. et. cetera), and so forth, additional.
exhib. (L. exhibeatur), let it be given, administer.
ext. (L. extractum), extract.
ext. fl. or fl.ext. (L. extractum fluidum or fluidextractum), fluid extract.

- F.**, **Fahr.** Fahrenheit. The Fahrenheit thermometer scale.
- Farm.** Pharmacopœa, the foreign name for pharmacopœia used in several countries; as, *Farm. Española*, (Sp.), *Farm. Mexicana*, (Mex.), *Farm. Ufficiale*, (It.), *Svenska Farm.* (Swed.), etc.
- fasc.** (L. *fasciculus*), bundle, armful.
- Fec.** (L. *Fecit*). He did it, he made it; made by the person whose name precedes the abbreviation.
- fem.** Female, feminine gender.
- fin.** (L. *ad finem*), at the end, finish.
- flt.** (L. *filtra*), filter, filter it.
- fl.** Before ounce or drachm, meaning fl.ounce (fl.℥), fluid drachm (fl.℥), fluid drachm.
- fl.** or **fd.** (L. *fluidus*), fluid; **fl. ext.**, fluid extract.
- flor.** (L. *flores*), flowers.
- fol.** (L. *folia*), leaves.
- For.** Foreign, a foreign country or thing.
- frac.** Fractional or fraction; **frac. p. c.**, fractional percent.
- f. s. a.** (L. *fiat secundum artem*), prepare skillfully.
- f. p.** (L. *fiat potio*), make a drink.
- fr.** French, France.
- fruct.** (L. *fructus*), fruits.
- ft.** (L. *fiat*), make, or let there be made: as **ft.h.** (*fiat haustus*), let a draught be made; **ft.mist.** (*fiat mistura*) make a mixture; **ft.pil** (*fiat pilulæ*) let pills be made.
- < From, or refer to, or see, as <U. S., <Br., <Part II, etc.
- Gm.** Gramme, the same abbreviation either sing. or pl., also written gm., gram, grm.
- gr.** (L. *granum*), grain, the same abbreviation commonly used for either sing. or pl., also written gn., grn., gns., grs. Because of the similarity of the abbreviations **gm.** and **gr.**, or **gms.** and **grs.**, the word grains should always be written in full in formulas and prescriptions.
- gal.** Gallon, also abbreviated C. from *congius*, its Latin name.
- galv.** Galvanic, galvanism.
- gtt.** (L. *gutta*), a drop (pl. *guttæ*), drops, used in writing formulas and prescriptions, also written gt. or gtt.s.
- guttat.** (L. *guttatim*), by drops.
- h.** or **hr.** Hour, the time designated, as ½ hr., etc.
- H. D.** (L. *horâ decubitûs*), at bedtime.
- hgd.** Hogshead, a large cask of uncertain measure, containing usually about 63 wine gallons.
- H. S.** (L. *horâ somni*), at the hour of going to sleep.
- i. e.** (L. *id est*), that is, or that is to say.
- inf.** (L. *infusum*), infusion (*infunde*), infuse.
- inj.** (L. *injection*), an injection (*injectionatur*), inject.
- jul.** (L. *julepus*), a julep.
- Kilo.** Kilogram, 1000 grammes.
- lb.** (L. *libra*), pound, used commercially, and sometimes in writing formulas.
- l.** Liter, U. S., litre, Fr., Br. etc. The unit of metric fluid measure=1000 Cc. Commonly used in European countries.
- lib.** (L. *libra*), book.
- liq.** Liquor or liquid.
- M.** (L. *Meridiem*). Noon.
- m.** (L. *misce*), mix; let them be mixed, used in writing formulas and prescriptions: as **m.ft. pil.** No.XXIV.
- ℥.** Minim, the 480th part of a fl.ounce.
- mac.** (L. *macera*), macerate.
- man.** (L. *manipulus*), a handful.
- mass.** (L. *massa*), as pill mass.
- M. D.** Doctor of medicine; physician.
- mdse.** Merchandise, any goods or articles usually bought or sold.
- meas.** Measure. A vessel used for measuring either solids or liquids. The quantity measured.
- med.** Medicine. The practice of, or the science of Medicine.
- Mem.** (L. *memento*), memorandum, remember.
- mfd.** Manufactured, made by a manufacturer.
- mfg.** Manufacturing.
- mfs.** Manufacturers.
- mist.** (L. *mistura*), mixture.
- mitt., mitte.** (L. *mittantur*), send, or let them be sent.
- mol. wt.** Molecular weight.
- mod. pres.** (L. *modo præscripto*), as directed.
- mor. dict.** (L. *more dicto*), as ordered.
- mor. sol.** (L. *more solito*), as usual, in the usual way.
- muc.** (L. *mucilago*), mucilage.
- Nat.** National; natural.
- Nat. Ord.** Natural order, in Bot. or Zoöl.

- N. B.** (L. *Nota bene*). Pay attention, note well.
- No.** (L. *numero*), number.
- noct.** (L. *nocte*), by night, at night.
- Nor. N.** Normal. In test solutions, U. S., as $N/1$ =normal; $N/2$ =semi-normal; $N/10$ =deci-normal; $N/100$ =centi-normal.
- N. T.** Normal temperature. In this work abbreviation adopted, in accordance with most authorities, at which sp.gr. is taken 15°C., 59°F. The U. S. P. now directs 25°C., 77°F. for most substances.
- neut.** Neuter.
- O.** (L. *Octarius*), $-\frac{1}{8}$ of a gallon. Pint. The U. S. Pint is 16 apothecary fl.ounces; the Br. Pint is 20 Imperial fl.ounces. <Weights and measures.
- obs.** Obsolete. Now seldom used; also observation, as explanatory of something which precedes it.
- ol.** (L. *oleum*), oil; as ol. olive, olive oil.
- off.** Official, Officinal.
- org.** Organic; as org. chem, organic chemistry.
- omn. hor.** (L. *omni horâ*), every hour.
- omn. bih.** (L. *omni bihorâ*), every two hours.
- o. m.** (L. *omni mane*), every morning.
- o. n.** (L. *omni nocte*), every night.
- opt.** (L. *optimus*), best quality, also optical.
- orig.** Origin, original.
- ov.** (L. *ovum*), an egg, ovary.
- oz.** (L. *uncia*), ounce; the avoirdupois ounce. For apothecary or troy ounce $\frac{3}{4}$ is generally used.
- P.** Part, used in this work, referring to Part I, II or III.
- p.** Page, pp. pages, followed by figures designating the number of the page or pages referred to.
- p. æ.** (L. *partes æquales*), equal parts.
- part. vic.** (L. *partitis vicibus*), in divided doses.
- past.** (L. *pastillus*), a pastil usually formed as a cone, and made of a pasty mass, dried.
- Path.** Pathology.
- phar.** Pharmacy, pharmacopœia.
- Ph.** or **P.** Pharmacopœia, as Br. Ph., British Pharmacopœia; Ph. G., German Pharmacopœia; U. S. P., United States Pharmacopœia.
- Ph. D.** Doctor of Pharmacy. One who has the degree of Doctor of Pharmacy.
- Ph. G.** Graduate of Pharmacy. One who has graduated in a regular course of pharmacy.
- Ph. L.** Pharmaceutical licensee. One who has been licensed by a Board of Pharmacy to practice pharmacy.
- Phot.** Photography, photographer.
- pkg.** Package. pkgs. packages.
- pl.** Plural, more than one.
- pil.** (L. *pilula*), a pill, (*pilulæ*), pills.
- P. M.** or **p. m.** (L. *post meridiem*), after meridian or afternoon.
- pond.** (L. *pondera*), by weight.
- ppt.** (L. *preparata*), prepared.
- p. rat. ætat.** (L. *pro ratione ætatis*), according to age.
- prox.** (L. *proximo*), next or following.
- pt.** Part, any specific part or portion.
- pt.** Pint. $\frac{1}{8}$ of one gallon, U. S. apothecary, 16 apothecaries' fl.ounces. Br. Imperial, 20 Imp. fl.ounces.
- p. t.** or **pro tem.** (L. *pro tempore*), for the time or for the present.
- prec.** (L. *precipita*), precipitate.
- prep.** Preparation, also preposition.
- pot.** (L. *potio*), a drink.
- p. r. n.** (L. *pro re nata*), occasionally, or as required.
- pugil.** (L. *pugillus*), a handful.
- pulv.** (L. *pulvis*), powder, powdered, in powder.
- q. l.** (L. *quantum lubet*), as much as you need.
- q. p.** (L. *quantum placet*), as much as you please.
- q. s.** (L. *quantum sufficiat*), as much as is necessary; as much as will suffice.
- q. v.** (L. *quantum vis*), as much as you will, also (L. *quod vide*), which see.
- qt.** Quart. One-fourth of a gallon; the U. S. quart is 32 apothecary fl.ounces, the Br. qt. is 40 Imperial fl.ounces, but the ounces differ slightly in quantity.
- R.** Radical. Used in some chemical works.
- ℞.** (L. *Recipe*), take, or take of. A sign used at the beginning of a prescription. First it was written with the sign of Jupiter, (♃) supposed to be an appeal for his favor; later it was changed to an abbreviation for the Latin *recipe*—meaning take of—the names of the substances following it being placed in the genitive.
- rad.** (L. *radix*), root; (pl. *radices*), roots.

ras. (L. *rasuræ*), raspings, filings.
R. Ré. Réamur; the Réamur thermometric scale.
rep. (L. *repetatur*), repeat, let it be repeated.
non rep. Do not repeat; written on prescriptions that are not to be repeated.
S. (L. *signa*), label or directions.
S. A. (L. *secundum artem*), with skill. Ft. S. A.—prepare skillfully.
Sc., $\mathfrak{S}$. Scruple, 20 grains Apothecary, now seldom used, grs. XX, being written instead.
sem. (L. *semen*), seed; (pl. *semina* or *semnes*), seeds.
semi-. One-half, half; **semi-dr.**, half a drachm; **semi-h.**, half-hour.
seq. (L. *sequens*), following or the following.
serv. (L. *serva*), preserved, (*servatur*) preserve.
S. F. (L. *Spiritus Frumenti*), whisky.
Sig. (L. *signetur*), let it be labeled; label it. Ex.: Sig. Cochl. parv. t. i. d. Teaspoonful three times a day.
sing. (L. *singulorum*), of each.
solv. (L. *solve*), dissolve. Used in directions for preparing medicines, formulas or prescriptions.
sq. Square; as a sq. ft.; sq. in.; sq. yd.
ss. (L. *semisis*), semi, or half or one-half. Written in prescriptions or formulas at the end of a line indicating quantity; as potass. acet. $\mathfrak{z}$ ss, meaning potassium acetate half an ounce.
sp. or spir. (L. *spiritus*), spirit or spirits.
sp. gr. Specific gravity or specific weight, also written s. g., spec. grav.
S. R. (L. *spiritus rectificatus*), alcohol 90% of the Br. P.
st. (L. *stet*), let it stand; stent, let them stand.
sum. (L. *sumat*), take; let him or her take.
sum., summ. (L. *summitates*), the summits or tops, as summit flowers growing at the top.
S. V. (L. *spiritus vini*), spirit of wine.
S. V. G. (L. *spiritus vini Gallici*), brandy.
S. V. R. (L. *spiritus vini rectificatus*), rectified spirit of wine.
S. V. T. (L. *spiritus vini tenuis*), proof spirit, diluted alcohol.
 syr. (L. *syrupus*), syrup, simple syrup.
T. Transcribe, copy, give a copy.
tab. (L. *tabella*), a tablet or lozenge.

—**Ft. tab.**, make into tablets.
tr. tinct. (L. *tinctura*), tincture.—**Ft. tinct.**, make a tincture.
Trial. Tralles; Tralles hydrometer scale, or alcoholometer.
t. i. d. (L. *ter in die*), three times a day.
T. S. Test solution. Used in U. S. P. and Br. P.
tub. (L. *tubera*), tuber.
ult. (L. *ultimo*), the last.
ung., ungt. (L. *unguentum*), ointment. **Ft. ungt.**, make an ointment.
vesic. (L. *vesicatorium*), a blister.—**Ft. visic.**, make a blister, (plaster).
V. S. Volumetric solution. Used in U. S. P. and Br. P.—Also Veterinary Surgeon.
v. or vid. (L. *vide*), see, or refer to.
vs. (L. *versus*), against, contrary, to.
viz. (L. *viddicet*), namely, followed by names of persons or things.
vol. Volume, volumetric; as alc. by vol.; alcohol by volume; vol. sol., volumetric solution.
wt. Weight; as av. wt., avoirdupois weight, tr. wt., troy weight etc.
yd. Yard, 36 inches, 3 feet.

Signs used in Pharmacy.

$\mathfrak{m}$. (L. *minimum*), minim, $\frac{1}{480}$ part of a fluid ounce, $\frac{1}{60}$ part of a fl. drachm.
 $\mathfrak{S}$ (L. *scrupulum*), scruple, 20 grains, $\frac{1}{3}$ of an apothecary drachm.
 $\mathfrak{z}$ (L. *drachma*), drachm, 60 grains, $\frac{1}{8}$ of an apothecary ounce.
 $\mathfrak{z}$ (L. *uncia*), ounce, the apothecary ounce of 480 grains.
 $\mathfrak{f}\mathfrak{z}$. Fluid drachm, fl. dr., 60 minims, $\frac{1}{8}$ of an apothecary fluid ounce.
 $\mathfrak{f}\mathfrak{z}$. Fluid ounce, fl. ounce, 480 minims, 8 fl. drs., $\frac{1}{16}$ of the apothecary pint, (16 ounces).
 $^{\circ}$. Degree sign, as 15°C. , 60°F. , 10°Be.
 $\%$. Percentage sign, parts in 100, as 5%.
 $<$. This sign before the name or abbreviation for the name of an authority or reference, means quoted from or taken from, or according to, refer to, as $<\text{U. S.}$, $<\text{P. II.}$, etc.

Botanical Signs.

⊙ A plant which dies after flowering and fruiting; a monocarpic plant, may be annual, biennial, or of longer duration.

- ① Annual; an annual plant, lives only one year or one season.
 ② Biennial; a biennial plant, lives two years or seasons.
 2 Perennial; lasting or living year after year.
 Δ Evergreen; having green foliage all the year round.
 ♂ Male plant or flower.
 ♀ Female plant or flower.
 ♀ Hermaphrodite plant or flower.
 ∞ Indefinitely numerous; e. g. ∞ -andra, polyandrous.

ABBREVIATIONS.

Pharmaceutical Authorities and References.

- AL.—Allemand, German. Abbreviation used in French for the German name or Germany.
 AM., AMER.—American. The American name or country.
 ANG.—Anglais, English. Abbreviation used in French works for England or English.
 AR., ARAB.—Arabic. The Arabic name or language.
 AUS., AUST.—Austrian, Pharmacopoea Austriaca. The Austrian Pharmacopoeia.
 AUST.—Australia. The Australian name or country.
 BAT.—Batavia, Pharmacopoea Batavia, (New Netherlands).
 BELG.—Belgian, Pharmacopoea Belgica. Belgian Pharmacopoeia.
 BORUSS. (V. Boruss)—Pharmacopoea Bourissica. The Prussian Pharmacopoeia.
 BR., BRIT.—British Pharmacopoeia, (Br. P.).
 B. P. C.—British Pharmaceutical Conference Formulary.
 COD., CODEX—Codex Medicamentarius. The French Pharmacopoeia.
 DAN.—Danish, Pharmacopoea Danica. The Danish Pharmacopoeia.
 DRES. FORM.—Dresden Formulary.
 DUB.—Dublin Pharmacopoeia.
 DUTCH.—Holland, Nederland. Nederlandsche Pharmacopoe.
 ED.—Edinburg Pharmacopoeia.
 ENG.—English. The English language or name.
 ESP.—Spanish, Farmacopea Española. The Spanish Pharmacopoeia, generally referred to in this work as Sp.
 FENN.—Fennish or Finnish. Pharmacopaea Fennica. The Fennish Pharmacopoeia.
 FR.—French. Pharmacopée Française. The French Pharmacopoeia, (Codex Medicamentarius).
 GALL.—Gallica. French. Abbreviation used in German works for the French Pharmacopoeia. Pharmacopoea Gallica.
 GENEV.—Geneva, Pharmacopoea Genevensis. The Geneva Pharmacopoeia.
 GER., GERM.—German, Pharmacopoea Germanica, (P. G.). The German Pharmacopoeia.
 GERM. S.—The Supplement to the German Pharmacopoeia.
 GR., GREC.—Greek or Grecian. The Grecian Pharmacopoeia.
 HAMB.—Hamburg, Codex-Medicamentarius Hamburgensis, (V. Hamb.). The Hamburg Pharmacopoeia.
 HAN.—Hanover, Pharmacopoea für Hanover. The Hanover Pharmacopoeia.
 HELV.—Helvetia, Helvetian Pharmacopoea Helvetica. The Swiss Pharmacopoeia.
 HISP.—Hispania, abbreviation used in German works for Spanish Pharmacopoeia. Farmacopea Española.
 HOL.—Holland, Nederlandsche Pharmacopoe. The Netherlands Pharmacopoeia.
 HUNG.—Hungary, Hungarian, Pharmacopoea Hungarica. The Hungarian Pharmacopoeia.
 IT., ITAL.—Italy, Italian, Farmacopea Ufficiale del Regno d'Italia. The Italian Pharmacopoeia.
 IND.—India, Pharmacopoeia Indica. Indian Pharmacopoeia.
 I. & C. A.—Indian Colonial Addendum to Br. P.
 JAP.—Japan, Japanese, Pharmacopoeia Japonica. The Japanese Pharmacopoeia.
 LAT.—Latin, the Latin language or name.
 LOND.—London, The London Pharmacopoeia.
 MEX.—Mexico, Mexican, Farmacopea Mexicana. The Mexican Pharmacopoeia.
 NAT. FORM.—National Formulary of Unofficial Preparations.
 N. Y. & B.—New York and Brooklyn Formulary (U. S.).
 NDL.—Netherlands, Abbreviation used in German works for Pharmacopoea Nederlandica.

NEDL.—Netherlands, *Nederlandisch*, Abbreviation used in this work for *Ph. Nederlandica*. The Netherlands Pharmacopœia.

NEDL. S.—Supplement to the Netherlands Pharmacopœia.

NOR., NORV.—Norway, Norwegian, *Pharmacopœa Norvegica*. The Norwegian Pharmacopœia.

PER.—Persian, the Persian name or language.

PAR.—Paris, *Paris Pharmacologie*. The Paris Pharmacopœia.

POL.—Polish, *Pharmacopœa Regni Poloniae*. The Polish Pharmacopœia.

PORT.—Portugal, Portuguese, *Pharmacopœa Portugueza*. The Portugal Pharmacopœia.

PRUS.—Prussia, Prussian, *Pharmacopœa Borussia* (V. Boruss), The Prussian Pharmacopœia.

ROM.—Rome, Roman, *Pharmacopœa Romana*. The Roman Pharmacopœia.

RUS., RUSS.—Russia, Russian, *Pharmacopœa Rossica*. The Russian Pharmacopœia.

SARD.—Sardoa, Sardinia, *Pharmacopœa Sardoa*. The Sardinian Pharmacopœia.

SAX.—Saxony, *Pharmacopœa Saxonica*. The Saxony Pharmacopœia.

SW.—Swede, Swedish, *Svenska Farmakopén*. The Swedish Pharmacopœia (Suec.).

SWED., SV.—Swedish, abbreviation used in this work for the Swedish Pharmacopœia.

SWISS.—Helvetia, Helvetian, *Pharmacopœa Helvetica*. The Swiss Pharmacopœia.

TUR.—Turkey, Turkish. The Turkish name or language. *Pharmacopœa Taurinensis*.

U. S.—United States. The United States Pharmacopœia; also U. S. P.

VEN.—Venezuela, *Farmacopœa Venezolana*. The Venezuela Pharmacopœia.

WIRT., WURT.—Wurtemberg, *Pharmacopœa Wurtembergia*. The Wurtemberg Pharmacopœia.

first of two combinations having the same general name; as *α-naphthol*, *alpha-naphthol*.

a-, an- In medicine and chemistry used as a privative, denoting the want of, or absence of the quality or thing signified; (a- before a consonant, an- before a vowel) as a-septic, not septic; a-septol, a preparation against a septic condition; an-algesia, absence of pain; an-algesic, a preparation to overcome pain.

ab- From, away from, off; as ab-sorb, to suck from; ab-tract, to draw from; ab-stain, to keep from, etc.

ac- A prefix having the same meaning as ad-, but used before c and q; as ac-cessory, an aid to; ac-quit, to free from.

acantho- Pertaining to a prickle, thorn or spike. Denoting the spinous shape of an appendage or organ.

acephalo- Signifying without a head or headless.

acet- Combining form denoting acetic or acetyl, used before a vowel. The acet-ic radical CH_3C .

aceto- Combining form pertaining to acetic acid or its derivatives; as aceto-bromide etc.

acro- Signifying topmost; as acrogen, a plant growing only at the apex; acro-spire, the first sprout from a seed.

actin-, actini-, actino- Combining forms, denoting rays, or radiate structure; as actini-form, having a ray-like form etc.

acu- From Latin *acus*, needle; denoting sharp-pointed; as acu-lens, a pricker; acu-te, sharp or sharp-pointed.

acuti-, acuto- Denoting sharp, or sharp-pointed.

ad- Above, over, adjacent or near to; as ad-here, to stick to; ad-renal, above renal, same as supra-renal.

aden-, adeni-, adeno- Relating to gland; as aden-oid, glandular; aden-oma, a tumor of glandular structure.

aer-, aeri-, aero- Pertaining to air or gas; as aer-meter, an apparatus for weighing air or other gases; aer-ate, to charge with gas, as with carbon-dioxide.

ag- The same as ad-, but used before g for euphony; as ag-glutinate.

al- The Arabic definite article used as a prefix; as al-kohol (alcohol); al-kali, etc.; also signifies whiteness,

Prefixes.

The following Prefixes are in general use in pharmacy and medicine:

α- Greek *α*, alpha. In chemistry this signifies the first of a series or the

- clearness or purity, as al-bumen, (white of egg).
- allo-** Other, denoting another state or condition; as allo-tropism, the property of having other forms without change of chemical composition; as carbon, phosphorus and sulphur; allopathy, the treatment of disease by inducing other or opposite conditions.
- amblo-, ambly-, amblyo-** From Greek amblys, blunt; applied to form or shape, or dullness or lack of perception; also abortion or miscarriage; as amblo-sis.
- ammo-** From Greek ammos, sand. Used in botanical names of plants which frequent sandy places.
- amphi-** Signifying in two ways, or upon both ends or sides. Used chiefly in Bot. and Zoöl.
- ampeli-, ampelo-** From Latin ampelos, vine. Relating to vines; as ampelop-sis etc.
- amylo-** Pertaining to starch; as amyloid, starch-like.
- an-** Against, in, to, on both sides, not etc.
- ana-** Up, back again, through again; ana-bolism, ana-sarca, ana-tomy.
- andro-** Meaning man in a general sense, but used more commonly in botany to describe the male organs of plants.
- angio-** A combining form used in botany and pathology to denote a capsule or capsular case or vessel.
- ant-** The same as anti-. Used before a vowel; as ant-acid.
- ante-** Before, either in position, time or order.
- antho-** From Greek anthos, flowers. Relating to flowers.
- anthrac-, anthraco-** From Greek anthrax, a coal. Resembling or relating to coal; as anthrac-oid, resembling anthrax or carbuncle, anthracite, a kind of hard coal etc.
- anthropo-** Pertaining to or like man; as anthro-pology, the science of man.
- anti-ant-** Against or opposed to, (ant- before a vowel, anti- before a consonant); as ant-acid, correcting acidity; anti-phlogistic, against a septic condition; anti-pyrim, a remedy reducing temperature, etc.
- ap-, apo-** Prefix signifying from, off, away; also **aph-**, having the same meaning.
- ar-** Prefix, same signification as ad-.
- arterio-** Combining form, relating to the arteries; as arterio-sclerosis etc.
- arthro-** Combining form relating to a joint.
- aster-, asteri-, astero-** From Greek aster, a star. Relating to the star shape or form as generally understood, also **astro-**.
- audi-** Relating to sound or hearing or the ear and its functions.
- auto-** Meaning self; as auto-graph, self-written, auto-intoxication, self-intoxication, as by overeating.
- azo-** Derived from azote (nitrogen). Relating to nitrogen combinations, called azo compounds; azo-tate, a nitrate.
- β -** Gr. beta. In chemistry signifying the second of a series or of two combinations having the same general name; as β -naphthol, beta-naphthol.
- bacteri-, bacterio-** A combining form relating to bacteria; as Bacteri-ology etc.
- be-** Prefix signifying by, near or about.
- bi-** meaning double or two; used before a word beginning with a consonant, as bi-carbonate, bi-chloride, etc.
- bin-** The same as bi-, but used before a word beginning with a vowel; as bin-oxide, bin-iodine, etc.
- bio-** A combining form meaning life; as bio-logical etc.
- blasto-** A combining form used in Botany and Embryology; relating to the embryo.
- brom-, bromo-** Relating to bromine; a combining form used chiefly in chemical compounds.
- bronchi-** A combining form relating to bronchial organs.
- broncho-** Relating to the wind-pipe and its ramifications.
- calc-** Denoting the presence of lime, **calca-, calci-**.
- calori-** Denoting heat. A combining form derived from **calor**, heat.
- cardio-** Relating to the heart. A combining form pertaining to the heart.
- centi-** Denoting 100 or hundredth, as centi-gram, one-hundredth of a gram; centi-grade, graduated to a scale of a hundred.
- cephal-, cephalo-** Relating to the head.
- cerebri-, cerebro-** Relating to the brain.

- cervico-** Relating to the neck or cervix.
- cet-, ceto-** Relating to the whale or spermaceti.
- chemico-** A combining word relating to chemistry; as chemico-medical.
- chlor-, chloro-** Denoting a combination with chlorine, or a greenish color; as chlor-acetic, chloro-hydric, chloro-phyl etc.
- chol-, chole- cholo-** Relating to the liver, its functions and products, especially indicating the gall or gall bladder.
- chrom-, chromo- chroma-, chromato-** Relating to color; as a chroma-toscope.
- chrys-, chryso-** From Greek chrysos, gold. Denoting a golden-yellow color.
- contra-** Prefix, meaning against or opposite to, or contrary to.
- cranio-** Relative to the skull or cranium.
- de-** From or out, used in a privative sense; as de-hydrate, de-corticate, etc.
- demi-** Half or half of, or a part of.
- denti-** Relating to a tooth or teeth; as denti-form.
- derma-, dermato-, dermo-** Relating to the derma, or skin; as dermatology etc.
- di-** Meaning two or double; as hydrogen di-oxide, carbon di-oxide, etc.; used the same as bi-.
- dia-** In medicine, meaning through; as dia-betes, pass through; dia-phoretic, a medicine that causes sweat to pass through. In pharmacy di-alysis means to loose through or separate through.
- dialy-** Signifying separation or separate; as dialy-sis, the separating of substances of different physical conditions.
- dis-** Meaning apart from or separation; as dis-intergrate, to break apart; dis-pense, to weigh from; dis-sect, to cut apart; dis-solve, to separate, etc.
- dys-** In medicine meaning difficult or painful; as dys-pnoea, difficult breathing; dys-entary, painful evacuation, etc.
- e-** Prefix meaning from, out, out of; used before consonants instead of ex- in many cases.
- ec-** Out; as ec-bolic, a throwing out; ec-zema, boiling over or out.
- ef-** Out; as ef-florescence, blooming out; ef-fusion, pouring out; ef-fluvium, blowing out.
- el-** A prefix used before a word beginning with a vowel, and having the same signification as e- before a consonant.
- em-** In, within; as em-brocation, an application to soak in; em-bryo, an egg within, etc.
- en-** The same meaning as em-. Examples: En-dosmosis, passing in; en-dogen, a plant that grows within; en-teritis, inflammation of the intestines; en-ema, a medicine to inject.
- encephal-, encephalo-** Pertaining to the brain.
- endo-** Internal, within; as endo-carpic, endo-colotis, endo-gastric, etc.
- ent- ento-** The same as endo- (ent- before a vowel, ento- before a consonant).
- entero-** Within the intestines, or relating to the intestines.
- epi-** Upon, over, outside; as epi-dermis, the outer skin; epi-demic, upon the people; epi-glottis, over or above the glottis.
- ex-** Out; as ex-pression, pressing out; ex-siccation, drying out; ex-traction, drawing out, etc.
- extra-** Outside or external to; extravasation, extra-uterine, etc.
- flor-, flori-** From Latin flos, flower. Relating to flower or flowers.
- flo-, fluor-** Combining forms signifying either combinations with fluorine, or fluorescence.
- fore-** A prefix signifying before, or in front of, or previous to. It has the same meaning as a suffix -fore.
- galact-, galacto-** From Greek gala, milk. Combining forms relating to milk; as galact-agogue, a medicine which increases the secretion of milk etc.
- gastr-, gastero-, gastro-** Relating to the stomach.
- glosso-** From Greek glossa, the tongue. Combining form.
- glyc-, glyco-** Signifying sweet. Combining forms from Greek glykys, sweet; glyc-erin, glyc-yrhiza, glyco-cholic etc.
- gran-** Relating to grains or a substance in the form of grains; as granular, gran-ulated etc.
- gymno-, gymn-** From Greek gymnos, naked. Combining forms used in Botany and other natural sciences.

gyne-, gyneco- Pertaining to woman, feminine; from Greek *gyne*, woman, female. In medicine pertaining to female diseases or operations; as *gyne-cology*, the treatment of diseases of woman.

hæma- (or **hæmo-**) Pertaining to the blood; as *hæma-tin*, a principle contained in the blood; *hæma-tura*, blood in the urine; *hæmo-rrhage*, flow of blood; *hæmo-static*, something that arrests the flow of blood.

hemi- Half or one-half; as *hemi-crania*, headache on one side; *hemiplegia*, paralysis of the motor nerves on one side of the body.

hep- or (**hepat-**) Relating to the liver; *hep-atis*, inflammation of the liver; *hepar sulph.*, liver of sulphur.

hept-, hepta- Denoting seven. Combining forms considerably used in chemistry, botany etc.

hetero- Meaning unlike or dissimilar; as *hetero-geneous*, composed of dissimilar substances; *hetero-pathy*, treatment of diseases by opposites.

hex-, hexa- Denoting six. Combining forms considerably used in chemistry, botany etc.

homo-, hom- From Greek *homos*, meaning the same, or like unto. A combining form; as *homo-geneous*, *hom-ologous*.

homœo- (or **homo-**) Like or similar; as *homo-geneous*, alike in qualities, composition or structure; *homo-logous*, in chemistry compounds having the same elements and increasing by a common difference, as *homologous series*; *homœopathy*, the treatment of diseases by remedies which produce a like condition.

hydra- A combining form denoting water or the presence of water, or relating to water; **hydr-a**, **hydr-i**, **hydr-o**.

hydro- (**hydr-** before a vowel) Signifying water. A compound of which water forms a structural part. Also a compound of hydrogen with an element; as *hydro-carbon*, *hydro-chloride*, etc. *Hydro-pathy*, the treatment of disease by water; *hydro-phobia*, the fear of water.

hygro- Relating to moisture of the atmosphere; a combining form; as *hygro-scope*, *hygro-meter* etc.

hyper- Signifying over, excess, or an abnormal increase. In chemistry the highest of a series.

hypn- (or **hypno-**) Denoting sleep; as *hypnotic*, a medicine producing sleep.

hypo- (or **hyp-** before a vowel) Under, lower or less than, least. In chemistry the lowest degree of oxidation; as *hypo-phosphite*, *hypo-chlorous*; *hypo-thetical*, an assumed basis or beginning of a series.

hystera- **o-** Relating to the womb; as *hystera-lgia*, neuralgia of the womb; *hyster-ectomy*, removal of the womb.

ichthy-, ichthyo- Relating to fish; a combining form; as *ichthy-ol*, *ichthyo-colla*.

im- or **in-** As a negative; *im-pure*, not pure; *in-active*, not active; *in-compatible*, not compatible; *in-soluble*, not soluble.

in- In or within; as *in-halation*, drawing in; *in-jection*, throwing in; *in-fusion*, melting in, incubation.

inter- Between; as *inter-action*, action between; *inter-cellular*, between cells or walls.

iso- Equal. In chemistry *iso-mers* are bodies having the same elements united in the same percentages, but differing in the arrangement of the molecules and their properties. *Iso-late*, to set apart, to obtain in a free uncombined state, as to isolate an element.

lacto- Relating to milk or denoting a compound in which milk in some form is employed.

laparo- Relating to the abdominal walls or abdomen.

laryng-, laryngo- Relating to the larynx; as *laryng-itis*, an inflamed condition of the larynx; *laryngoscope*, an instrument for examining the larynx.

leuco- Whiteness, *leucorrhœa*, *leucomanies*, etc.

lith- or **litho-** Pertaining to stone; as *lith-ontriptic*, a medicine for dissolving stone in the bladder or kidney; *lith-uria*, an excess of uric acid in the system.

macro- Enlargement, hypertrophy; as *macro-scopic*, large enough to be seen by the naked eye, as distinguished from *microscopic*; *macro-melus*, excessive development of any part or organ.

mal- Bad, wrong, ill or evil; as *mal-formation*, *mal-ignant*, *mal-ady*, *mal-aria* etc.

meso- The middle, or the middle part of a body or organ.

meta- In chemistry denoting that an oxygen acid has been formed from an ortho-acid by withdrawing one, two or three molecules of water; as meta-phosphoric acid, meta-boric acid, etc.

micro- Signifying minute, smallness, etc.; as micro-scopic, micro-organism.

mis- Wrongly or wrong; as mis-cariage, mis-use etc.

mon- or **mono-** In chemistry denoting singleness, or one, as mon-acetic, mono-basic, etc.

multi- Many, a number, as contrasted with one or two; multi-form, multi-polar, multi-para.

myelo- Referring to the brain or the spinal cord; as myel-itis.

myo- Pertaining to the muscles or muscularity.

neph- or **nephro-** From Greek nephros, kidney. Relating to the functions and diseases of the kidneys; as neph-ritis etc.

neuro- ra- re- ri- Relating to the nerves, or nervous diseases; as neuro-pathy, neur-algia, neur-ectomy, neur-itis, etc.

nitr- or **nitro-** In chemistry indicating the presence of nitrogen in any form; and the action of nitrogen with other substances to produce various combinations.

non- Meaning not; as non-metallic, not metallic; non-solvent, not solvent; non-toxic etc.

odonto- Of or pertaining to the teeth; as odonto-logy, a treatise on the teeth; odonto-pathy, treating of the teeth.

oc- A prefix having the same meaning as ob- and od-. Used in the sense of hiding or concealing; as occlusion, absorption of a gas by metal; oc-cult, the hidden.

oligo- Fewness of, lack of; as oligo-cholia, deficiency of bile; oligo-hæmia, deficiency of blood.

oleo- Relating to oil; as oleo-margarine; oleo-resin.

op- The same as ob-, used euphonically.

ophthalmo- Relating to the eye.

ortho- Normal or true, right, straight. The normal or natural when more than one form exists; as the ortho-series, ortho-phosphate, etc.; distinguished from meta- and para-compounds.

osteo- Relating to the bones, the science of the bony structure. Osteopathy, the treatment based on the assumption that diseases are caused by conditions of the bones.

ossi- Derived from Latin os, bone. Relating to bone.

ovi- Relating to an egg; ovi-form, having the form of an egg.

oxy- Sharp or sour, denoting the presence of oxygen. Also **oxi-**; as in oxidation, etc.

par- or **para-** Meaning near or beside. In chemistry indicating similarity of properties, form or composition; as par-aldehyde, para-formaldehyde.

per- In chemistry meaning the highest combination of an acid with a base, when several combinations may be made; as per-oxide of hydrogen, perchloride of iron, per-manganate of potassium. In pharmacy it may mean through; as per-colation.

peri- Around, surrounding; as pericarditis, inflammation of the covering around the heart; peri-carp, the shell or covering of a fruit; peri-osteum, the covering of a bone.

pharmaco- From Greek pharmacon, meaning drug. All words beginning with **pharm** relate to drugs and medicines.

poly- Many; as poly-meric, having several combinations of the same atoms, in the same proportions; poly-morphous, having many forms.

post- After or behind; the opposite of anti-

pre- **præ-** Before; as pre-scription, a writing before; pre-mature, something that occurs before the time; pre-ventive, a medicine that acts before a disease to prevent it.

pro- Before, down from; as process, an issue from; prolapse, a slipping down; prognosis, a statement of the probable progress and result of a disease.

proto- Meaning first. In chemistry denoting the lowest member of a series, or the lowest combination of a base with a combining element.

pseudo- Seeming, false; as pseudo-codeine, etc.; pseudo-membrane, a false membrane.

pyo- Relating to pus; as pyo-genic, forming or secreting pus.

pyr- or **pyro-** A combining form signifying heat or fire. In chemistry pyro-compounds are those in which

- heat has been employed to produce the combination, as pyro-ligneous, pyro-gallol etc.
- quadr-** or **quadri-** Meaning four. In chemistry a salt having four hydrogen atoms replaceable by bases or basic radicals.
- quasi-** Appearing like or similar to; not fully the same, but having the same characteristics or properties.
- re-** Signifying back or backwards, over again, repeated; as re-absorb, re-combine, re-crystallize etc.
- retro-** Backward; as retro-version, turning backward.
- sal-** Salt; sometimes used as a prefix; as sal-ætatus, sal-iva, sal-ivation, etc.
- semi-** Half, or partly; as semi-vitri-ous, partly vitrious; semi-circular, half circular; semi-fluid, partly fluid.
- sesqui-** Signifying one-half more. In chemistry it indicates the presence of three atoms of one element combined with two atoms of another; as sesqui-oxide, containing two basic radical atoms combined with three of oxygen.
- sub-** Under, beneath; as sub-carbon-ate, an under carbonate; sub-mer-sion, being beneath the surface; sub-cutaneous, beneath the skin.
- super-** Upon or above; as super-im-posed; superficial, upon the surface; super-natant, floating above; super-salt, a salt containing an excess of acid; super-saturated, containing more of a salt than can be held in solution.
- supra-** Above; used in the same sense as super. Supra-renal.
- sur-** Above or over, the same as supra- or super-; as sur-renal, supra-renal, sur-face etc.
- sym-** **syn-** Together, with; as synthe-sis, placing or uniting together; syn-chronous; at the same time together.
- ter-** Meaning three. In chemistry a prefix used for salts containing three acid atoms or radicals; as ter-sul-phate, ter-chloride.
- tetra-** Denoting four; as tetra-basic, tetra-boric acid, etc.
- thermo-** A combining word signifying heat. Many thermo- instruments are employed in chemistry, electric-ity and physics.
- thyro-** Relating to the thyroid gland.
- trans-** or **tran-** Meaning beyond, across, through; as trans-fusion, trans-formation, trans-migration etc.
- tri-** Signifying three; as tri-atomic, tri-valent, tri-axial etc.
- tris-** The same as tri-, applied eu-phonically to some chemical combi-nations, as tris-nitrate of bismuth etc.
- ultra-** Meaning beyond or on the other side of; as ultra-violet etc.
- un-** A prefix used before many words, expressing reversal of the action or condition implied by the root word, generally signifying not, as un-real.
- uni-** Meaning one or single; as uni-valent, having a valence of one; uni-axial, having only one axis. Various combinations much used in botany and biology.
- uro-** Relating to urine; as uro-lithic, uro-meter, etc.
- utero-** Relating to the uterus or womb; as utero-tomy, uterine surgery.
- vagino-** Relating to the vagina; as vagino-tomy, surgical treatment of the vagina; vagini-tis, inflammation of the vagina.
- vari-** Resembling or similar to some condition; as vari-oloid, resembling small-pox; vari-cose, resembling a tumor.
- vasi-** or **vaso-** A combining word sig-nifying a constriction in a circulating vessel, which may either restrict or accelerate the action of the blood or nerve fluids; as vaso-motor, vaso-constrictor etc.
- vermi-** A combining word signifying worm; as vermi-fuge, a remedy that expels worms; vermi-form, shaped like a worm etc.
- vesico-** A combining word relating to the bladder.
- vini-** or **vino-** A combining word re-lating to grape vines or wines.
- vulvo-** Relating to the vulva; as vulvi-tis, inflammation of the vulva.
- xantho-** Denoting yellowness, as xan-tho-ma, xantho-pathy, xantho-phyll, etc.
- xylo-** Relating to wood, as xylo-id, resembling wood.
- zoö-** Relating to animal life. as zoö-logy, the natural history of animals; zoö-tomy, dissecting of animals.
- zymo-** A combining word signifying ferment or leaven. From zyme, a ferment; zymo-scope, an instrument showing the degree of fermentation.

Suffixes and Terminations.

The following Suffixes and Terminations are in general use in pharmacy and medicine.

-ac Pertaining to, having; as cardi-ac, mani-ac.

-ad., -ade. Related to, pertaining to; as mon-ad, di-ad, tri-ad; having one, two or three of the specified elements or parts; lemon-ade, an ade or drink with lemon as its chief ingredient.

-æ. A genitive and plural termination of certain Latin words.

-æmia. A condition of the system as regards blood; as an-æmia, lacking blood; or a condition of the blood; as hydr-æmia, watery blood; py-æmia pus in the blood; ur-æmia, uremic poison in the blood, etc.

-agogue. Denoting a medicine that carries off or away, or stimulates an organ to perform its function; as an emmen-agogue, a medicine that stimulates the menstrual flow; a hydr-agogue, a medicine that causes watery discharges; sial-agogue, a medicine that causes flow of saliva.

-agra. Signifying an acute attack of pain; as arthr-agia, pod-agia, etc.

-al. In chemistry, derivatives of aldehyde; as acet-al, brom-al, chlor-al, etc.

-algia. Signifying pain in the part or organ denoted by the word preceding it; as gastr-algia, pain in the stomach; neur-algia, nerve pain, etc.

-an. Pertaining to; as Itali-an, amphybi-an, Columbi-an, etc.

-ane. In chemistry denoting a hydrocarbon of the paraffin series; as menth-ane, pent-ane, prop-ane, etc.

-ate. In chemistry denoting salts produced by the union of acids whose names end in -ic with bases; as carbon-ate, nitr-ate, sulph-ate, tartr-ate., -ic changed into -ate; -ic acids from -ate salts.

-cele. A tumor or protrusion; as hydro-cele, varico-cele, etc.

-ectomy. Denoting the cutting away or incision of all or a part of an organ; as nephro-ectomy, splen-ectomy, etc.

-ene. In chemistry denoting a hydrocarbon belonging to the olefine series; as benz-ene, anthrac-ene, etc.

-et. A suffix denoting diminution; as carbur-et, phosphor-et, sulphur-et.

-ed. Denoting combination; as carbonat-ed, sulphurat-ed, phosphorat-ed, etc.

-ful. Full of; as cup-ful, teaspoon-ful, wineglass-ful.

-fy. Meaning make or to make; as forti-fy, make stronger; magni-fy, make larger; puri-fy, make purer.

-gen. In chemistry denoting producing or producer; as hydro-gen, water producer; oxy-gen, acid producer, etc.

-genous. Having the quality of bearing or producing; as nitro-genous, bearing nitrogen, etc.

-graph. An instrument for writing or drawing or the drawing or writing produced; as stylo-graph, auto-graph, etc.

-graphy. A treatise or writing or drawing; as geo-graphy, bio-graphy.

-ic. In chemistry denoting the combination of a greater proportion of the element or acid than -ous; as nitr-ic contains a greater proportion of oxygen than nitr-ous acid; ferric compounds contain a greater proportion of oxygen than fer-rous. (-ic acids produce -ate salts).

-id. A termination used in chemistry to form names of compounds, the same as -ide; as sulph-id, brom-id.

-ide. In chemistry signifying a union of two elements, this suffix being applied to the negative element of the compound; as potassium iod-ide, calcium chlor-ide, zinc-phosph-ide, etc.

-in. A termination of Latin feminine nouns, generally used to denote plant and animal properties that are not basic, but neutral; as salic-in, santon-in, digestal-in, adrenal-in, etc. This termination is also used by some authorities to designate alkaloidal salts, as morph-in sulphate, quin-in sulphate, etc.

-ine. A termination generally used to denote an alkaloid or basic principle of plant or animal substances; as morph-ine, quin-ine, veratr-ine, etc. Some authorities use the termination -in to denote the basic principle. but -ine is more generally used.

-ite. A termination denoting a salt of an -ous acid; as sulph-ite, a salt of a base with sulphurous acid; phosph-ite, a salt of a base with phosphorous acid.

-itis. Denoting inflammation of a part or an organ; as cyst-itis, in-

- In chemistry denotes a compound in which the element with which it is combined has less.
- path, -pathy.** Signifying adherence to the principles or practice indicated by the word preceding it; as homœo-path, osteo-path, allo-path.
 - pathy.** Relating to the treatment of disease by certain systems; as allo-pathy, homœo-pathy, hydro-pathy, osteo-pathy, etc.
 - phobia.** Great fear or dread of; as hydro-phobia, dread of water.
 - rhage, -rhagia.** Bursting forth or out; as hemor-rhage, blenner-rhagia, etc.
 - rhœa.** An abnormal or excessive discharge; as diar-rhœa, leucor-rhœa, etc.
 - scope.** Relating to an instrument for examining; as laryngo-scope, stetho-scope, etc.
 - tomy.** Denotes cutting; as anatomy, laparo-tomy, tracheo-tomy.
 - ule.** A diminutive termination; as nod-ule, ov-ule, etc.
 - uret.** A suffix formerly used in chemistry to denote a binary compound of elements, like carbon and sulphur; as carb-uret, sulph-uret; but now -ide is used instead; as carbide, sulph-ide, etc.
 - ute.** A suffix signifying quality or action; as absol-ute, destit-ute, execute, etc.
 - uria.** Diseased condition relating to the urine; as albumin-uria, poly-uria, etc.
 - yl.** Denoting a radical; as meth-yl, the radical of methylic alcohol.
 - flammation of the bladder; gastritis, inflammation of the stomach; appendic-itis, inflammation of the appendix, etc.
 - lite, -lith.** Relating to stone. Used in mineral names.
 - logy.** A treatise on or study of a subject; as pharmaco-logy, bio-logy, patho-logy, bacterio-logy, etc.
 - mania.** A mental condition expressed by the word preceding it; as klepto-mania.
 - ment.** A termination denoting condition or action; as improve-ment, achieve-ment etc.
 - meter.** Measure; as acido-meter, hydro-meter, thermo-meter, etc.
 - nomy.** The science of; as astronomy, the science of stars.
 - oid.** Like or similar to; as alkali-oid, similar to, (being basic) an alkali; resin-oid, like a resin, etc.
 - ol.** In chemistry denoting an alcohol or alcoholic properties; as phenol, carbin-ol; also generally an oil or substance having the properties of an oil; as glycer-ol.
 - ole.** A suffix having the same meaning as -ol.
 - oma.** Signifying a tumor; as glioma, sarc-oma, etc.
 - one.** In chemistry designating certain compounds having the general formula C_2H_{2n-4} ; as acet-one, hex-one, ket-one, etc.
 - opia.** Relating to the vision or to the eye; as my-opia, amply-opia, etc.
 - ose.** The same as -ous.
 - ous.** Denotes presence of a quality or degree in fullness or abundance.

MEDICAL, PHARMACEUTICAL AND CHEMICAL TERMS

A

Aberrant. Differing from the usual type or group. Wandering, varying from the regular form or class.

Aberration. In optics any imperfection or dispersion or refraction of light causing a halo or blur of colors. In the polariscope, spectroscope and telescope, aberration frequently occurs; the violet rays, being more refrangible than the red rays, are brought to a focus nearer the lens, and the image of the object under examination is surrounded by a halo of colors.

Abluent. In chemistry or pharmacy a substance used to wash out, or cleanse by washing out, any undesirable part of a compound, as water is abluent for washing precipitates; ether an abluent for washing solution of opium, in making deodorized tincture of opium, etc.

Ablution. Washing out or cleansing. In chemistry or pharmacy separation of chemical impurities or undesirable constituents by washing with water, alkaloids with ether, etc.

Abnormal. Unnatural, not conforming to established form or course, as abnormal development of plants or animals or organs; abnormal form of crystals, abnormal action of chemicals or medicines.

Abortifacient. A drug or combination of drugs intended to produce the expulsion of the fetus. These drugs cause uterine contraction. This term is sometimes used for medicines intended to abort or prevent the development of disease, as fever, smallpox, etc. An abortive.

Abortion. The premature expulsion of the fetus, miscarriage.

Abortive. In medicine the same as abortifacient. In botany a part barren or defective or imperfectly developed.

Abrasion. The removal by mechanical means of the exterior portion of a substance, as abrasion of the skin

or teeth, abrasion of roots, seeds or bark.

Abrasive. A substance which causes abrasion, as sand, emery, tripoli, carborundum, etc. A gritty substance.

Abraum Salts. Large deposits of salts found in Stassfurt, Prussia, and extensively used in the manufacture of potassium salts.

Abrazitic. Non-effervescent when submitted to chemical action or heat.

Abscess. Med. A collection of purulent matter or pus in a cavity or some tissue or organ of the body; usually resulting from some inflammation which has caused suppuration.

Absolute. In chemistry and pharmacy a term used to indicate the highest degree of strength or purity, as "absolute alcohol," the strongest alcohol obtainable—free from water, (see Alcohol); "absolute acid," meaning the real acid independent of any solvent or diluent, (see Acid); "absolute ether," ether which contains no other substance, as water or spirit—but only molecules of ether, (see Ether).

In physics "absolute zero" is that degree of temperature at which a body is wholly deprived of heat, or at which a perfect gas would exert no pressure. This is supposed to be about -273°C. , (-459°F.) (minus).

Absolute temperature is reckoned from absolute zero as 0° , making the freezing temperature of water 273° absolute, (see Heat Measures). Absolute vacuum is an enclosed space containing no material substances.

Absorbent. A substance which sucks or draws from, or takes up, as "absorbent cotton," "absorbent sponge," etc. In chemistry a substance which absorbs or takes up a liquid or gas, as charcoal, quick lime, manganese, chalk, etc., or a liquid which absorbs or dissolves gas, as water absorbs ammonia or the gaseous acids. In medicine a substance which induces or causes absorption, as of

pus, lymph, or other fluid, or gas.

Abstergent. In medicine a cleansing substance, particularly a lotion for a sore or wound. A detergent.

Abstract. In pharmacy a preparation representing double the medicinal constituents of a vegetable drug. See Abstracts.

Abstraction. In pharmacy the process of removing one part of a substance from another, as in distilling the volatile part is abstracted or separated from the non-volatile.

Acerbity. Sourness combined with astringency and bitterness.

Acetates. 1. In chemistry, salts produced by the union of acetic acid with bases. 2. In pharmacy, medicated vinegars. Preparations in which acetic acid or vinegar are used as a menstruum for obtaining the medicinal properties of drugs, (see Aceta).

Acetic. Having the nature of vinegar. Of, or pertaining to vinegar or acetic acid.

Acetification. The process by which saccharine or diluted alcoholic liquids are converted into vinegar or acetic acid, by atmospheric oxidation, (see Acetum).

Acetifier. An apparatus for producing acetification, (see Acetum).

Acetify. To change or convert into vinegar.

Acetimeter. A graduated tube or burette in which the acid strength of vinegar or acetic acid may be tested by the addition of an alkaline solution and an "indicator" which changes color and shows when the acid is neutralized.

Acetimetry. The process of determining the acid strength or percentage of vinegar or acetic acid by means of the acetimeter.

Acetous. 1. Having the characteristics of vinegar or acetic acid. 2. Relating to the production of vinegar, as by the acetous fermentation.

Acetylation. In chemistry the union of acetic acid or acetyl with bases or radicals.

Acid. 1. In a popular sense any substance sour to the taste; some acids, being insoluble, do not have any sour taste, but are known by tests to be acids. 2. In chemistry, a compound of hydrogen, all or a part of which may be displaced by a metal

or basic radical, forming a new compound called a "salt," (see Acida). *Hydracids* are acids in which hydrogen combines directly with a basic element, as hydrochloric acid, HCl, hydriodic acid, HI, hydrobromic acid, HBr, etc.

Oxyacids are those in which oxygen is present in combination as nitric acid, HNO₃, sulphuric acid, H₂SO₄, phosphoric acid, H₃PO₄, etc.

Acidify. To make acid or to change into an acid condition.

Acidification. The act of combining substances to produce an acid.

Acidity. The degree of acid strength or sourness, or the property of being acid.

Acidimeter. An apparatus for determining the acid strength or percentage of an acid substance, especially for determining the acid percentage of grape must or other fruit juices, wines, cider, etc.; as Twitchell's Acidimeter.

Acidimetry. The process of determining the strength of acids by the use of standard test alkali solutions and an "indicator" with or without the use of an acidimeter.

Acidulous. Having acid taste or reaction, having the properties of an acid.

Acidulate. The act of acidulation or making sour; acidulating.

Acne. A skin disease usually occurring during adolescence. It is manifested by pimples on the face, breast and back. The pimples usually contain matter and are known as maggot pimples.

Acology. The science of remedies, surgical and medicinal.

Acrid. A pungent, corrosive irritant, as an acid drug, having a biting or burning taste or smell. Acridity, the quality of being acrimonious or acid.

Acrometer. An instrument for determining the specific gravity of oils.

Actinic. Relating to radiation of light and heat; as the actinic rays which are shown by the spectrum to be the most instrumental in producing chemical change. They are also called "chemical rays."

Action. In chemistry the operation by which chemicals unite or are disassociated is called chemical action. A base and an acid enter into

chemical action, producing a salt.

Active. In chemistry one substance may be chemically active to another substance, while another may be passive or without action.

Activity. The force with which chemicals unite is called chemical activity.

Acupuncture. In medicine the method of treating by thrusting needles into the body is called acupuncture. It is considerably practiced in China and Japan. *Acus.* In surgery a probe or pointed instrument or needle.

Adenitis. Glandular inflammation. Inflammation of the adenoids.

Adhere. The act of sticking to or adhering, one substance to another.

Adhesion. The quality of sticking to or adhering, one substance to another.

Adhesive. The property of adhesiveness or sticking together of substances.

Adjuvant. An aid or assistant; a helper. 1. In medicine, any substance designed to assist the principal means. 2. In pharmacy, a flavored cordial designed to carry more active medicines, as "adjuvant elixir," "adjuvant cordial," etc.

Aërate. The act of aërating or forcing gas or air into a liquid or solid under pressure as in aërating mineral waters or charging them with gas.

Aërated. The condition of aëration or being filled with air or gas, as aërated water, aërated bread, etc.

Aëration. The process of aërating, or forcing gas or air into a liquid or other substance under pressure.

Aërometer. An instrument for ascertaining the density of gases.

Aëroscope. An instrument for estimating the quantity of dust in the atmosphere.

Affinity. In chemistry the force by which atoms or molecules are attracted to each other—chemical attraction. This force is inherent in atoms and is exerted in inappreciable distances and between definite and invariable weights of the combining elements.

Affusion. The act of washing or pouring water or other liquid upon a substance or body.

Agent. In chemistry a substance or force that effects a change—as a

chemical agent. In medicine a remedy given to produce a change or effect a cure—as a medicinal or therapeutic agent.

Albuminuria. A diseased condition manifested by the presence of albumen in the urine.

Alchemic or Alchemical. Pertaining to or relating to Alchemy.

Alchemist. One who practiced or was skilled in Alchemy. Among the Alchemists of the middle ages were many learned men who were leaders in the scientific pursuits of the age in which they lived.

Alchemy, Chemistry, or Hermetics. The primitive chemistry of the middle ages. The present science of chemistry had its origin in alchemy which was strenuously pursued by a class of experimenters and investigators who sought, among other things, to find the *Philosophers Stone*, which would transmute the baser metals into gold; and to discover the *Alcahest*, reputed to be a liquid which would resolve all bodies into their constituent elements; and *Elixir Vitæ* which prolonged life indefinitely. One writer says that "Alchemy was the sickly, but imaginative infancy through which infant chemistry had to pass before it attained its majority, or in other words, became a positive science." Many of the discoveries which are so important in modern chemistry originated with Alchemy, and Alchemy was practiced by its followers long after chemistry became an acknowledged science.

Alcoholate. In chemistry, a crystalline compound in which an alcohol is the acid radical.

Alcoholmeter. Another name for a hydrometer used for ascertaining the alcoholic percentages of spirits.

Alcohols. In pharmacy but two alcohols are known, ethyl or grain alcohol, which is the common alcohol of commerce, distilled from fermented grain; and methyl, or wood alcohol, which is obtained from the product of the destructive distillation of wood. In chemistry twelve normal primary alcohols are known, besides a large number of other compounds which are chemically classed as alcohols, (see Alcohols).

Aldane. In chemistry a substance formed by the union of two or more

molecules of an aldehyde, with elimination of water. <Stand. Dict.

Aldehydes. Derived from alcohols by the elimination of H_2 . They are intermediate between alcohols and acids, each alcohol having a corresponding aldehyde. Aldehydes corresponding with eleven of the primary alcohols are known and are generally prepared by the oxidation of these alcohols, (see Aldehyde).

Alembic. A distilling apparatus of metal or glass, introduced by the alchemists. It consists of a matrass or cucurbit which contains the substance to be distilled and a head or condenser fitted upon it with a tube slanting downward to conduct the distilled liquid into a receptacle. The modern retort which is derived from it is the same in principle.

Alkalies. In commerce caustic potash and caustic soda are known as alkalies; also soda ash, and the carbonate of potassium and sodium are sometimes called alkalies. In chemistry the hydroxides of sodium, potassium, lithium, barium, cesium and rubidium are known as alkali metals, and solutions of ammonia gas are frequently called alkalies, (see Alkalies). They are all strongly positive bases.

Alkalimeter. An instrument used for determining the percentage of an alkali.

Alkalimetry. The process of determining the percentage of alkali by means of an acid test solution and "indicator."

Alkaline. Having the characteristics of an alkali; of or pertaining to an alkali.

Alkaloids. Organic nitrogenous bases, found in animal and vegetable substances, either as bases or salts, from which they may be obtained, (see Alkaloids).

Alkaloidal. Pertaining to an alkaloid, as alkaloidal salt. Like an alkaloid or a derivative of an alkaloid.

Allopath or Allopathist. A physician of the allopathic or "regular school of medicine," or one who practices allopathy.

Allopathy. A school or system of medical treatment in which it is attempted to cure diseases by inducing an opposite condition or antipathy, the converse of Homœopathy, in

which remedies are given which produce like or similar conditions as the disease. It is also known as the "regular system or practice of medicine."

Allotropism. The property which certain elements or compounds possess of assuming different physical characteristics while retaining the same chemical composition. Phosphorus, carbon and Sulphur are examples of allotropic elements, (see Isomerism).

Allotropy. The variation in physical characteristics shown by elements or compounds, without chemical change.

Alloy. Usually a compound of two or more metals which unite by fusion to form a homogeneous body. The alloy or compound may possess properties differing from the metals which compose it, as melting point, ductility, malleability, etc.

Alopecia. Baldness. Absence of hair from a portion or all of the scalp.

Alpha. In a series of isomeric compounds alpha is frequently used to denote the first and Beta- to denote the second combination.

Alterative. A medicine intended to alter or change a diseased condition to a normal state.

Amalgam. A compound or alloy of mercury with some other metal. They differ from alloys as generally known, by being combined at ordinary temperatures, while alloys require heat to fuse the metals.

Amalgamation. The process of forming an amalgam. This is extensively used in extracting gold and silver from powdered quartz or other rock.

Amalgamator. The apparatus used in mining for amalgamating or separating gold and silver from ores.

Amenorrhœa. Suppression or absence of menstruation when it is due or should normally be present.

Amides. Organic compounds derived from ammonia by the substitution of acid-radicals for hydrogen.

Amidogen. The hypothetical radical of amides.

Amines. Basic organic compounds derived from ammonia by the substitution of alcohol radicals for hydrogen atoms. Mon-amines, di-amines, tri-amines, etc., are produced as one, two, three, or more atoms of hydrogen are displaced by the alcohol radical.

Amorphous. Without form. In chemistry this term is applied to salts or precipitates without crystalline form as "amorphous salt," "amorphous powder," etc.

Ampère. A unit of measurement of an electric current, an ampère being the electro-motive force or strength of one volt produced in a circuit through a wire of one ohm of resistance.

Anæmia. Deficiency of red corpuscles in the blood.

Anæsthetic. A substance administered, usually by inhalation, to produce anæsthesia or unconsciousness, as ether, chloroform, etc.

Analeptics. Medicines or foods which act as restoratives or tonics.

Analgesics. Medicines intended to combat or allay pain, or cause insensibility to pain.

Analysér. 1. One who analyses. 2. The plate of a polariscope which separates chemical rays.

Analysis. In chemistry, the act or process of separating a compound substance into its parts; of determining the simple substances which compose the compound. Opposed to synthesis, which is the act or process of combining substances to produce a compound.

Qualitative Analysis. The act of identifying the component parts of which a body is composed, without regard to their quantity or proportion in the compound. In making chemical analysis only qualitative analysis may be required in many cases, this analysis being preliminary to quantitative determination. The substance to be analysed is first tested with various reagents, and afterwards, if required, subjected to quantitative analysis.

Quantitative Analysis. This consists (after identification of the constituents of the compound by qualitative analysis) of the determination of the quantities of some or all of the substances composing the compound, and sometimes of their relative proportion, either by weight or volume, or both.

Gravimetric Analysis. The method of quantitatively determining the constituents of a compound by weight.

Volumetric Analysis. The method of quantitatively determining the con-

stituents of a compound by volume. Many substances require only gravimetric analysis, while others require determination of gaseous elements which may be in combination or solution, and must be estimated by their volumes.

Analyst. One who analyses—a chemist.

Analytic. Pertaining to analysis, as an analytical experiment.

Analytical. The same as analytic; as an analytical chemist.

Anaphrodisiacs. Medicines intended to diminish sexual desire.

Anasarca. General dropsy. Accumulation of serum in the alveolar tissues of the body.

Anhydride. An acid from which the elements of water have been removed, or an oxide which becomes an acid when water is added. Any oxide, whether basic or acid, uncombined with water.

Anhydrous. Without water. In chemistry applied particularly to a salt from which the water of crystallization has been removed or is absent, or an acid, alcohol, ether or similar liquid substance which contains no water. Anhydrous salts are those in which hydroxyl or constitutional water is absent.

Anion. An electro-negative element which is separated from a compound and appears at the anode or positive pole of a battery when a compound substance is decomposed by electrical action. It is opposed to cation which is the electro-positive element appearing at the same time at the negative pole of a battery.

Annual. In botany plants that live only one season.

Anode. The positive voltaic pole of a battery or the plate or place where the positive current is discharged. Opposed to cathode, which is the negative pole of a battery.

Anodynes. Drugs or medicines that diminish sensibility or relieve pain, as morphine, opium etc.

Antacids. Substances used to neutralize acidity of the stomach or bowels, as soda magnesia, etc.

Anthelmintics. Drugs intended to destroy intestinal worms. Worm medicines.

Anthrax. A carbuncle or tumor of the cellular tissue ending in mortifi-

- cation and discharge of bloody pus. A species of boil.
- Antiarthritics.** Medicines designed to relieve gout.
- Antibilious.** Antibilious medicines are supposed to stimulate the flow of bile and thus cleanse the system of impurities, or relieve a bilious condition.
- Antihydropsics.** Medicines intended to relieve or cure dropsy.
- Antilithics.** Medicines intended to dissolve calcareous deposits or stone in the bladder or kidneys.
- Antiperiodics.** Drugs or medicines employed in the treatment of malarial fevers, as cinchona, quinine, etc.
- Antipyretics.** Drugs or preparations employed to reduce the temperature of the body in fevers and feverish conditions, as acetanilide, phenacetin, etc.
- Antiseptics.** Substances which have the property of preventing putrefaction, fermentation and decay, by destroying septic and fermentive germs.
- Antispasmodics.** Medicines employed to relieve spasmodic conditions and nervous irritability.
- Antisyphilitics.** Medicines which antagonize or combat syphilitic poison or conditions.
- Antizymotics.** Substances which destroy disease-germs of zymotic origin.
- Aperients.** Medicines which act as mild purgatives or laxatives, more particularly saline preparations.
- Aphrodisiacs.** Medicines or drugs used to promote or stimulate sexual desire.
- Apothecary.** One who dispenses drugs and compounds prescriptions; distinguished from druggist by meaning one skilled in pharmacy. This title is more generally used in European countries while "pharmacist," which means the same thing, is more generally employed in this country.
- Apothecary Shop.** A store or pharmacy where medicines are dispensed and prescriptions compounded.
- Apparatus.** The utensils and machinery used in the drug business in the preparations of medicines are called "pharmaceutical apparatus." The utensils and apparatus used in the production and testing of chemicals are called "chemical apparatus."
- Aromatic Bitters.** Medicines containing aromatics with simple bitter stomachics and spirits. Designed to increase the appetite and promote digestion by giving tone to the digestive organs.
- Aromatics.** Drugs having a fragrant, spicy odor and taste and are used for their flavor, or as a stimulant to digestion or to the mucous membrane.
- Aromatic or Benzene Series.** This is known as the fifth series of hydrocarbons, C_nH_{2n-6} .
- Aseptic.** Free from septic matter. The treatment of wounds to prevent septic contamination.
- Aspirator.** A hollow needle for withdrawing pus or serum without the admission of air.
- Assay.** 1. In chemistry the act or process of analyzing or assaying ores, metals, alloys, etc., to determine their composition and value. 2. The ore, metal or other substance to be assayed. 3. The product or result of an assay. Various processes are employed for assaying, among which may be mentioned roasting, scorification, cupellation, parting, quartation, solution, amalgamation, smelting, etc.
- Assayer.** One who conducts an assay.
- Assaying.** The process of making or conducting an assay.
- Assimilation.** The digestive process of changing food into such condition that it may be taken up by the absorbing vessels of the body.
- Asthma.** A spasmodic constriction of the bronchial tubes, manifested by difficult breathing.
- Astringents.** Substances used either internally or externally to contract the tissues or membranes, or to "pucker" the mucous membrane.
- Atom.** In chemistry the indivisible unit of an elementary substance. Physically an atom is the smallest conceivable portion of an element.
- Atomic.** Relating or pertaining to an atom or atoms, as "the atomic theory," etc.
- Atomic Bonds.** The chemical conception is that each atom has poles, like a magnet, that attract at infinitesimal distances, atoms of opposite electrical state which join or unite as with bonds. The elements vary as to the number of poles which they

present to be bound or bonded, for example; hydrogen, sodium and chlorine atoms have but one pole, oxygen has two, nitrogen has three, carbon four, phosphorus five, chromium six. In graphic formulas these bonds are indicated by dashes, as H— (hydrogen). —O— (oxygen). H—H, (the hydrogen molecule). H—O—H, (the water molecule).

—N—, (nitrogen). —C—, (carbon).

The dashes representing the valence of the element.

Atomic Theory. The theory that all substances are composed of indivisible atoms having definite combining force and comparative weight. Also called atomic philosophy.

Atomic Volume. The space occupied by an element compared with its atomic weight, obtained by dividing the specific gravity of an element by its atomic weight.

Atomic Weight. The weight of any element compared with the weight of an equal volume of hydrogen or oxygen. The system of atomic weights now universally acknowledged is founded upon the law of volumes as formulated by Avogadro, Ampère and others. This law is "that equal volumes of different gases at the same temperature and pressure contain an equal number of molecules." This law applies to all elements of which gases or vapors have been obtained, but the same conditions of temperature and pressure must be observed in each, the weight of the given volumes of the gas or vapor compared with the weight of an equal volume of hydrogen or oxygen being the atomic weight of the element. The weight of vapors of different elements at different temperatures may be calculated by the law of Charles and Gay-Lussac, which is that "all gases expand equally by heat provided the pressure remains constant." The rate of expansion being $\frac{1}{273}$ of the volume at 0°C. for each rise of 1°C. in temperature. It will thus be seen that the rate of expansion corresponds with the absolute temperature, the volume increasing from 0° absolute, which is -273°C.

Atomicity. The combining or satu-

rating power of an element is called its atomicity; this is also called Valency and Equivalence. The number of atoms of an element which unite with another element or elements to form a molecule is its valency or atomicity.

Atomizer. An apparatus or instrument for producing a spray or minute division of liquids by causing air under pressure to pass through a small tube and come in contact with a fine stream of the liquid to be "atomized."

Attraction, Chemical. The attraction of atoms, (see Affinity).

B

Bacteria. Microscopic organisms or microbes consisting of single, spherical, comma-shaped, rod-shaped or cork-screw-shaped cells, or aggregates of such cells. They exist in air, water, and most moist vegetable and animal substance, and are found in the fluids and canals of animal bodies. Various diseases are attributed to their presence in the human body, and they are important factors in fermentation, septic and putrefactive processes.

Barometer. An instrument showing the density, weight or pressure of the atmosphere. The most common barometer is one in which a column of mercury in a glass tube is sustained by the weight of the atmosphere.

Bases. 1. In chemistry bases are generally electro-positive bodies, either elementary or compound with which acids or electro-negative elements or substances may combine, forming salts, either acid or neutral. Chemicals are known as monobasic, dibasic, tribasic, etc., according to their degree of saturation. The metals, their oxides and hydroxides, the hydrogen compounds of nitrogen, (the ammonia group), the anhydrides which are the oxides of non-metals, the alcohols and the alcohol radicals together with some substances which are both basic and acid, are classed as bases. 2. In pharmacy bases are the substantial part or ingredient of a compound, with which medicaments may be combined, as alcoholic base or ointment base, etc.

Basic. Having the nature of a base.

In chemistry a basic salt is one that contains more than sufficient of the basic ingredient to neutralize the acid with which it is combined.

Bath. In pharmacy and chemistry, a means of regulating the degree of heat for various purposes. The Water-bath, glycerin-bath, oil-bath and sand bath are used; the vessel containing the substance to be heated being partly surrounded with the heated water, glycerin, oil or sand, and heat applied to the bath.

Battery. Generally galvanic or electric, consisting of a cell or cells, either for generation or storage of electricity. Diffusion batteries consist of a number of tanks connected together for the purpose of exhausting sugar from beets, which they contain, or drugs, by passing the diffusate or percolate from one tank to another, (see Diffusion).

Bitters Medicines having a bitter taste. Prepared medicines designed to improve the appetite, and act as a tonic to the mucous membrane of the digestive tract.

Blend. This name is sometimes applied to a mixture of liquors or to other substances, as grains for malting, mixed coffees, etc.

Blisters. Plasters or liquids which, when applied to the skin cause exudation of serum.

Bunsen Burner. A gas burner so arranged as to admit a current of air at the base that mixes with the gas in the tube which constitutes the burner, thus giving more perfect combustion and a hotter flame.

Burette. A tall, graduated tube so arranged that a liquid may be drawn from it in small quantities or drop by drop. A stop-cock or pinch-cock is usually attached at the lower end to regulate the flow of the liquid.

Burns. Destruction of the cuticle or skin or tissues by coming in contact with a heated substance or fire. Distinguished from scalds, which are caused by steam or some heated liquid.

C

Calefacients. Medicines applied externally to cause a feeling of warmth.

Cardiac Medicines. Heart medicines. Depressants, employed to lower arterial action. Stimulants,

employed to increase heart action or arterial tension.

Carminatives. Medicines containing aromatic stimulants or volatile oils and intended to promote peristaltic action and expulsion of gas from the bowels.

Capsules. 1. In pharmacy a capsule is a small hollow or filled shell of gelatin, in which liquids, powders, or masses may be dispensed. 2. In chemistry (also in pharmacy) a capsule is a small, shallow dish or vessel which may be used for evaporating a liquid, or for fusing crystals or salts or for incinerating a small quantity of any residue. They are made of glass, porcelain or platinum. A tared capsule is a weighed capsule, into which a substance to be evaporated is placed and weighed before and after evaporation.

Casserole. A small stew-pan or dish, deeper than a capsule, usually made of porcelain, used by chemists for heating, evaporating, etc.

Catalyser. In chemistry certain chemical reactions are greatly hastened by the use of copper of some chemical salt which acts as a catalyser. For example, in making chlorine gas, air is blown through concentrated hydrochloric acid and passes over pumice stone contained in a hard glass tube, the pumice stone having been previously soaked in a concentrated solution of copper sulphate and then ignited to redness. The copper acts as a catalyser, but no traces of it appear in the chlorine which is produced by the operation. Many other chemical reactions are accelerated by the use of a catalyser.

Catalysis. A chemical change induced in a compound by the presence of a substance which is not itself changed or decomposed. Many medicinal substances, as pancreatin, pepsin etc., are catalytic in their action.

Cathartics. Purgatives or medicines which cause prompt movement of the bowels.

Cation or Cathion. An electro-positive element. When chemical salts are decomposed by electrolysis the element which is disengaged at the negative pole or cathode of the battery is a Cation. Opposed to Anion which is disengaged at the positive pole or anode.

Cathode or **Kathode**. The negative pole of a galvanic battery—opposed to anode, which is the positive pole.

Caustics. Substances which destroy or cauterize living tissue, as caustic potash, lunar caustic etc.

Cell. 1. In botany and biology the smallest part of an organized body having vitality, or through the functions of which the vital processes are exercised. 2. In electricity one element of a voltaic battery. A jar containing a liquid in which are immersed the metals or other substances which produce the electric current.

Chemical Action. Any change which involves the alteration of the molecules of which a substance is composed may be called chemical action. Elementary atoms unite to form molecules and may be disunited to form other unions with other atoms. The atoms remain the same but chemical action combines and recombines them into molecules producing an infinite variety of substances, differing in form, color, taste and other characteristics.

Chemical Formulas. These are expressed by the chemical symbols, sometimes preceded by regular size figures and sometimes followed by small (inferior or superior) figures. The following are examples: The U. S., Br., and several European authorities use inferior figures as, Ferrous Sulphate, $\text{FeSO}_4 + 7\text{H}_2\text{O} = 277.42$. The French, Mexican, Italian and several European authorities use superior instead of inferior figures as Sulfate ferreux, $\text{SO}^4\text{Fe} + 7\text{H}^2\text{O} = 278$.

Chemism or **Chemical Affinity**. The force, energy or attraction which is inherent in atoms and causes them to unite or combine with other atoms to form molecules.

Cholagogues. Medicines which cause an increased secretion of bile by the liver.

Cohesion. The force by which masses of matter consisting of molecules are held together.

Conductivity. The capacity which a substance has for conduction, either of heat, light, electricity or sound.

Conductor. Any substance which conducts or through which energy is transmitted, as a wire is a conductor of electricity; a copper rod is a conductor of heat; or through which a

gas or fluid may pass, as a water-pipe or gas-pipe.

Constringents. The same as astringents.

Convulsants. Medicines which produce or cause convulsions.

Correctives. Medicines intended to modify the action of other medicines as to prevent griping of purgatives etc.

Corrigent. A corrective ingredient added to a medicine to modify the action of other ingredients, as warm aromatics are added to purgatives to prevent griping.

Coulomb. The practical unit of quantity in measuring electricity. The amount conveyed by one ampère in one second and corresponding to the amount required for decomposing .0935 milligram of water.

Crucible. A vessel of deep form, made of fire-clay and baked, or of plumbago or platinum and designed for fusing metals or other substances requiring a high degree of heat. The Hessian crucibles are considered the best variety of fire-clay crucibles.

Cupel. A shallow, absorbent vessel, usually made of bone dust; used in making an assay by cupellation.

Cupellation. The process of assaying an alloy containing lead by converting the lead into an oxide by a high degree of heat in a current of air. The oxidized lead then melts and sinks into the cupel, leaving gold, silver or other unoxidized metals on the surface.

Current. In electricity the flow or transmission of the electric force through a conducting medium or along a conductor. The unit of the electric current is the ampère which is equal to one coulomb per second.

D

Decomposition. In chemistry the breaking up of a chemical compound, which may be accomplished by the interaction of another compound or by electrolysis.

Dehydration. The removal of the elements of water from a compound; or the abstraction of hydrogen from a molecule.

Deliquescence. The softening or partial solution of crystalline, granular or amorphous salts by absorption of moisture from the atmosphere.

Demulcents. Mucilaginous medicaments intended to protect or allay irritated mucous surfaces or tissues. Usually used in liquid form.

Denarcotize. To remove narcotic constituents or principles. Denarcotized,—relating to a substance from which the narcotic properties have been removed.

Density. The weight of a substance compared with its volume is called its density. The term is also used to express compactness of mass or closeness of texture. A body may be dense in texture without having proportionate weight. Compare aluminum and gold, ether and chloroform. The density of water at 4° C. (39.1° F.) at mean atmospheric pressure at sea level is commonly taken as the unit of density. In the metric system, as the gramme is the mass of a cubic centimetre of water, the density of any substance may be compared with the weight in grammes of an equal mass of water.

Deobstruents. A term formerly used for medicines intended to remove obstructions, as laxatives. Now seldom used.

Deodorants. Substances intended to overcome or neutralize disagreeable or foul odors.

Deodorize. To remove odor from a substance, as to deodorize alcohol. Deodorized, relating to a substance or preparation from which the odor has been removed; as deodorized opium.

Depilatories. Substances intended to remove hair, especially superfluous hair or hair in an objectionable place.

Depolarize. To remove the polarity of a substance, as a magnet which has been depolarized by heat.

Depressants. Sedative medicines or those which reduce arterial or nervous excitement.

Depurants. Cleansing medicines; those which cause excretion or removal of effete matter, thus purifying the system.

Detergents. Medicines generally in the form of washes or lotions, intended to cleanse sores, wounds etc.

Dextro. Meaning right. Contrary to the left. Used chiefly in relation to polarized light. Dextro-rotary, circling to the right.

Diaphoretics. Medicines which promote sweating. Sudorifics.

Digestants. Medicines which aid digestion, by tonic action or by assisting the digestive fluids in their functions.

Dilutents. Medicines which dilute secretions, or so act as to cause a greater dilution of the circulating fluids of the body.

Disinfectants. Substances which neutralize or destroy disease-germs or noxious properties of decaying organic matter.

Diuretics. Medicines intended to promote the secretion of urine.

Double Salts. Some bases have the property of uniting with an acid to form double salts, as iron and ammonium citrate, bismuth and ammonium citrate and the alums.

Drastics. Violent purgatives which cause intestinal irritation.

Ductility. In metals the property of being drawn out, as into wire etc.

Dyad. In chemistry an atom, element or radical having the combining power of two units. The same as bivalent.

E

Ecboolics. Medicines which produce abortion or cause expulsion of the fœtus.

Eclectic. In medicine, a system which embraces any treatment or medicine which may seem efficient without adhering to dogmas of other schools. Eclectic physicians are those who select remedies from any or all sources.

Ectropotics. Laxatives. Mild cathartics or medicines which act mildly upon the bowels.

Effervescence. The bubbling caused by the escape of gas through a liquid at ordinary temperature, distinguished from boiling which is the escape of vapor at a high temperature.

Efflorescence. The decomposition of a crystalline substance in part or wholly, by exposure to air, with loss of water of crystallization. The efflorescence usually occurs on the surface of the crystals and gradually extends to the interior.

Electrode. One of the poles of a galvanic battery. The positive electrode is called the anode, and the negative pole the cathode.

Electrolysis. The method or process of decomposing a chemical salt or compound by passing an electric current through it, the positive elements being disengaged at the negative pole and the negative elements at the positive pole of the battery.

Electrolyte. A chemical salt or compound which may be decomposed by the electric current.

Electrotherapy. The treatment by means of electricity or electrical appliances, of various forms of disease. An electropathic physician is one who employs electricity in the treatment of diseases.

Element. In chemistry a primary substance which cannot be decomposed by any known means into other elements.

Elixir. Generally a sweetened aromatic, weakly alcoholic preparation or compound of a drug or drugs. See Elixirs.

Elutriation. A method of washing a pulverized, insoluble substance by stirring it with a quantity of water, letting the coarser particles subside and drawing off the liquid in which the finer particles are suspended.

Emetics. Medicines which cause emesis, or evacuation of the stomach. Vomiting. Ipecac, tartar emetic, lobelia, apomorphine etc.

Emmenagogues Medicines which assist or stimulate menstruation.

Emmollients. Substances applied to tissues to protect them, as vaseline, flaxseed, etc.

Empyreuma. The odor or taste which is produced when organic substances are heated in closed vessels or in covered pits or mounds, or when organic substances are subjected to destructive distillation. Tar and pyroligneous acid have an "empyreumatic" odor.

Emulsion. A preparation in which liquid substances, as oil, syrup or water, which are not soluble in each other are united in a homogeneous mixture by means of some adhesive substance. See Emulsions.

Endogen. In botany a plant which "grows from the inside." The endogens include most plants having parallel-veined leaves, as palms, corn, the grains and grasses, lilies, etc. Distinguished from Exogens "outside growers," which have most-

ly net-veined leaves and a bark separated from the woody portion by a cambium layer which the increased growth of the plant has deposited.

Enzyme. A chemical compound consisting of unorganized vegetable or animal substances which cause fermentation. Pepsin, ptyalin and diastase are examples.

Epispatics. Blisters. Applications which cause blisters.

Equivalence. In chemistry the equality or valence of atoms in a compound or molecule. The same as valence.

Equivalent. In chemistry the atomic power with which an atom combines with or displaces another atom. This is expressed in chemical formulas by figures which indicate the combining values of the atoms compared with hydrogen as 1, for example; hydrogen being 1, oxygen being 16, $H_2O = 18$. The figures following the = sign in a formula represent the atomic weight of the molecule.

Errhines. Medicines or preparations which increase the nasal secretions.

Escharotics. Caustics. Preparations which destroy the mucous membrane or the skin to which they are applied thereby killing abnormal or malignant growths, ulcers, etc.

Essence. In pharmacy the solution of an essential oil or the essential principles of a substance in spirit, as essence of peppermint, essence of Jamiaca ginger, etc.

In French pharmacy volatile oils (huiles volatiles) are also called essences.

In Spanish pharmacy esencia is the name for the essential oil (aceite volátil) of any plant. In Italian pharmacy essenza indicates the volatile oil. In U. S. and Br. pharmacy most of the spirits are commonly called essences.

The term is also applied to some solutions and tinctures of substances, as essence of opium, essence of coca, essence of pepsin etc.

Ester. A compound ether derived from an oxygenated acid. Ethyl, methyl, glyceryl and other esters corresponding with alcohol radicals are known and some of them are used.

Ether. 1. In a general sense the name ether is applied to any one of

a class of hydrocarbon compounds, prepared from alcohols by the action of acids, distillation, etc. The name of the acid employed usually precedes the word ether, as hydrobromic ether, chloric ether, sulphuric ether, etc. 2. In pharmacy the name Ether refers to the variety prepared by the action of sulphuric acid on ethyl alcohol, other ethers have the name of the acid preceding the word Ether, or are known by their chemical names as methyl oxide, ethyl oxide, etc. 3. The name "ether" is given to the supposed medium which occupies all space and through which the vibrations of light, heat and electricity are transmitted. This medium is supposed to fill the interstices between the molecules of matter, and to pervade all space, both terrestrial and interstellar.

Evacuants. Medicines which cause movement of the bowels; evacuation, principally purgatives.

Evaporation. The process of reducing the quantity of a fluid by exposure to a current of warm air or direct heat.

Excitants. Stimulants. Such medicines as stimulate the circulation, or cause increased arterial pressure.

Excito-motors. Medicines which increase motor activity.

Expectorants. Medicines which increase expectoration or the throwing off of mucous from the laryngeal muscles, the bronchial tubes etc.

Excipient. A substance added to or mixed with pill masses, suppositories, or other similar forms of medicine to give them the proper consistence. Syrup, honey, glycerin, soap, wax, starch glycerite, vaseline, etc., are used as excipients. See Pills.

Extraction. The process employed for obtaining the medicinal constituents of drugs, etc.

F

Faradic. This term is applied to medical electricity to denote rapidly alternating induced electric currents.

Faradism. The species of electricity caused by an induced electric current.

Faradizer. A form of battery or appliance which produces a Faradic current of electricity.

Farina. A kind of meal or flour pro-

duced from Indian corn or other farinaceous or starchy grains.

Febrifuges. Medicines which mitigate or dispel fevers.

Fecula. A name given to starch extracted by washing the pulp of farinaceous grain.

Ferment. A substance which may produce fermentation by the chemical decomposition of an organic compound. Fermentation is supposed to be caused by the action of living organisms, which are known as organized ferments, either vegetable, as yeast; or animalculæ, as bacteria, etc., or by the chemical or "unorganized ferments," or enzymes which induce catalytic action, as diastase in malting, pepsin in digestion, etc.

Filter. An apparatus or contrivance for separating insoluble matter or particles from fluids, or for cleansing liquids. The ordinary method of filtering in use in the drug business is to place a piece of filtering paper, properly folded, in a funnel, and pour the liquid to be filtered into it receiving the "filtrate" in a bottle or vessel placed beneath it.

Fining. A method of clarifying liquors, wines or beer, by the addition of isinglass, milk, white of egg, or other substances that carry suspended matter down with them as a precipitate.

Fluid. This term embraces all substances which yield readily to any force to change their position or equilibrium. Water and air are fluids, but water is also a liquid, while air is a mixture of gases, not classed with liquids, but it may be liquified by cold and pressure.

Fluorescence. The property possessed by some transparent substances of showing a milky color when illuminated. This property is caused by the reflection of light of greater wave lengths than the incident light of the bodies. Solution of quinine salts and many of the anilines are fluorescent.

Formula. A form of words or writing expressing an action or guide to be followed. In medicine a prescription or recipe directing certain drugs to be used in certain proportions; in optics a prescription directing certain focuses of glasses of spectacles; in chemistry symbols expressing the chemical composition of a compound.

An *empirical* formula is the expression by symbols and figures of the constituents of a compound, without regard to their arrangements or separation into radicals and acids, as H_2SO_4 , sulphuric acid; a *rational* or constitutional formula shows the composition of a body by the separation of the radical and the acid as $\text{H}_2\text{O} \cdot \text{SO}_3$, sulphuric acid; and a *graphic* or structural formula is shown by dashes representing connecting bonds, as $\text{H}-\text{O}-\text{H}$, water. See also Ions.

Fractionation. The method of separating the component parts of a body by various processes, as by fractional distillation—the lighter or more volatile portions coming over first and being reserved separately, from the heavier portions that come over after.

Fusion. The act of melting or liquifying solids by heat.

G

Galactagogues. Medicines which increase the secretion of milk or develop the lactial functions.

Galenicals. A general name for prepared medicines, not included among chemical preparations nor having a definite chemical composition, as infusions, extracts, fluid extracts, ointments, syrups, tinctures, etc.

Galvanic. Relating to electricity produced by chemical action. The same as voltaic. A galvanic battery is operated by the action of chemical decomposition.

Galvanism. The electricity produced by chemical action in a galvanic battery. Galvanic electricity is employed as a continuous or intermittent current in medical treatment.

Garbled. This term is applied to certain drugs that are cleaned of refuse or useless admixtures by garbling; as garbled senna, garbled spices, garbled gums, etc.

Gas. A form of matter in an æri-form state, which expands and contracts according to pressure and degree of temperature. The density of different gases vary greatly under the same pressure and temperature.

Gelatinous. Having the characteristics of jelly. Several medicinal preparations have the property of becoming gelatinous by standing. Preparations of senega, kino, gossypium,

sweet orange peel, etc., may be mentioned. Some gelatinous preparations are prepared as nutritious food.

Generation. In a general sense the production of, as the generation of gas, the generation of electricity, etc.

Germ. The vital element of reproduction. A micro-organism or microbe.

Germination. The process of development of a germ.

Germicide. A substance which may be used to kill or destroy germs or micro-organisms. A substance possessing germicidal properties.

Glacial. In chemistry a term applied to certain acids, which assume an ice-like appearance when crystallized, as glacial acetic acid.

Glucoside. Organic substances, which when treated with dilute acids, alkalies or certain ferments are decomposed, yielding glucose or some other form of sugar differing from the cane sugar class. The bitter principles of many plants are glucosides.

Graduate. 1. A graduated measure used by pharmacists for measuring liquids. Glass graduates are made for measuring minims (minum graduate), and for measuring drachms, fluid ounces, pints and quart; also for metric liquid measure, cubic centimeters to liters. Graduated tubes are also used for testing and graduated scales of various kinds are used for hydrometers, etc. 2. One who has graduated or completed a course and received a diploma from any college or school. as a graduate of pharmacy.

Granular. In the form of grains or granules. Granules are little pills, not larger than 1 grain; granular salts are composed of grains, larger or smaller; granulated drugs are coarse powders designed for percolation, generally a little coarser than granulated sugar.

Gravity. Relating to the weight of a solid or liquid. Specific gravity, the weight of a body in water, compared with its weight in the atmosphere.

H

Hæmostatics. Medicines or applications which arrest the flow of blood. Generally vegetable or metallic as-

tringents which constrict the blood vessels and cause stoppage of the flow.

Halogen. The elements fluorine, chlorine, bromine and iodine and, in some cases, the radical cyanogen are called halogens. They combine with other elements forming a series of electro-positive saline salts, which, from their similarity to sea salt, are called haloids. A halogen is therefore, a haloid producer. Common salt, potassium iodide and sodium bromide are haloids.

Haloid. A salt produced by the union of a halogen with an electro-positive element.

Heat. A form of energy produced by physical or chemical action. Heat may be generated by anything which disturbs the molecular arrangement of masses. Friction, electricity and chemical decomposition are the chief sources of heat. In either case it seems to be caused by molecular vibrations produced by the disturbances of the molecules of the substances acted upon, or imparted to surrounding media by such disturbance.

Herbaceous. Having the character of herbs; as an herbaceous plant.

Herbal. Pertaining to herbs or the use of herbs as remedies; as herbal remedies, herbalist, etc.

Herbarium. A collection of dried plants arranged in botanical order.

Homœopathic. 1. A class of preparations used by homœopathic physicians. 2. The treatment of diseases by homœopathy.

Homœopathy. A system or school of medicine originated by Hahnemann (1755-1843), founded on the principle that "like cures like." *Similia similibus curantur.*

Homogeneous. Having the same structure or composition throughout, or made up of the same parts or elements; as homogeneous mixture.

Homologous. In chemistry a class or series of substances of the same type and similar composition; as homologous series.

Humidity. The condition of being moist or saturated with vapor of water; especially relating to the moisture in the atmosphere.

Hydragogues. Purgatives which produce watery discharges, as elaterium, sodium phosphate etc.

Hyponitics. Medicines designed to produce sleep or allay excessive nervous irritation.

Hydrate. A compound of the elements of water (H_2O), with other atoms or molecules, and without breaking up and rearrangement of the atoms composing the H_2O .

Hydration. The process or act of producing a hydrate or causing a chemical compound to unite with the group H_2O in molecular combination.

Hydride. The union of hydrogen with another element, as hydrogen sulphide, H_2S , or a compound radical acting as an element.

Hydrolysis. The decomposition of a chemical compound that may occur when water is absorbed or taken up by it, forming new chemical compounds.

Hydrolytic. Pertaining to hydrolysis. A hydrolytic ferment is one which acts only in the presence of water, the combination resulting in hydrolysis. The digestive ferments are mostly hydrolytic.

Hydrometer. An instrument consisting of a bulb, filled with small shot, mercury, or other heavy substance, from which extends a graduated tube. It is used for determining the specific gravity of liquids, in which it may be floated. The depth to which the tube sinks in the liquid indicates the density or specific gravity of the liquid. Hydrometers are prepared with different scales for testing liquids of different kinds, acid hydrometers, alcoholometers, lactometers, saccharometers, etc. See Hydrometry.

Hydropathy. The treatment of disease by the application and use of water. Hydropathic physicians are those who treat by hydropathy.

Hydroxide. A compound containing the group OH , which is produced by the disassociation and rearrangement of the molecule of water, H_2O . It differs from hydrate by the rearrangement of the atoms of the molecule of water. Example: $BaO \cdot H_2O$, barium hydrate; $Ba(OH)_2$, barium hydroxide; the elements are the same but differently arranged.

Hydroxyl. The compound radical (OH) which occurs in alcohols, most acids and many organic compounds. It has not been isolated.

Hypodermic. Under the skin. Hypodermic injections are solutions of medicinal substances or lymph, which may be introduced by means of a hypodermic syringe.

Hypothesis. A theory supported by deduction from apparent facts or conditions, as atomic hypothesis, the nebular hypothesis, etc.

Hypothetical. In chemistry the term hypothetical is sometimes used in reference to a substance which, by the action of its compounds is supposed or assumed to exist but which has not been isolated as a distinct substance. A hypothetical radical for example. In medicine a statement of an assumed condition, from which a conclusion is drawn relative to something which has occurred, caused by this condition.

I

Idiopathic. In medicine a primary morbid condition not caused by nor related to any other disease. An individual, characteristic condition peculiar to the disease.

Imide. In chemistry a compound containing the divalent radical NH , united with a divalent acid radical.

Immune. Exempt from disease, especially a contagious disease, as by inoculation, or by reason of having had the disease before.

Indicator. In chemistry a substance which may color a solution but loses its color when some other substance of a different nature is added. Or a colorless solution which, in an acid liquid changes to a red (phenol-phthalein) upon the addition of certain alkaline solutions. Used for testing acid or alkaline solutions. Litmus, potassium permanganate, phenol-phthalein, turmeric, etc., are used as indicators.

Inhalant. A medicine used by inhalation or dawning in, through an apparatus by which the vapor of the medicine is applied to the affected parts.

Inhaler. An instrument by which an inhalant is administered, as a catarrhal inhaler etc.

Injection. A medicine used for injection or throwing in, or the act of injection. Distinguished from *enema*, which is an injection into the rectum.

Insoluble. Not soluble. The term

"insoluble" as generally used relates to some particular menstruum or vehicle, as "insoluble in water," "insoluble in alcohol or in ether," etc. A substance may be insoluble in all, or only in one or more liquids that are generally used as solvents.

Invert. In chemistry a term used to indicate turned or reversed, especially in regard to testing sugar with the polariscope. Invert-sugar or inverted sugar.

Ion. An element of one or more of the component atoms or parts of a compound liberated by electrolytic decomposition and appearing at one or the other pole of a dynamo or battery. From the fact that the two poles of a battery attract atoms of an opposite electrical state, the negatively charged ions appear at the positive pole and the positively charged ions at the negative pole. The positively charged ions are called "cations" and are designated with a plus sign. The negatively charged ions are called "anions" and are designated with a minus sign.

Ionization. The process by which chemical compounds are separated into ions is called electrolytic disassociation or "ionization." Solutions which are capable of conducting electricity and are called "electrolytes" are connected by inserting a wire from each pole of a battery or dynamo into them and are decomposed by "electrolysis" or the passage of electricity through them, the positive ions appearing at the negative pole, and the negative ones at the positive pole. In electrotyping and electro plating ionization is the process employed. The metal or the plus ion is deposited from a solution of the metallic salt at the negative anode of the dynamo or battery and the disassociated acid or minus ions are disengaged at the positive anode.

Isolate. To separate or obtain in a free state. Often used in connection with elements, as "this element has not yet been isolated," or "was isolated by — in—," meaning that it was obtained in an uncombined or free state.

Isologous. In chemistry applied to a series of hydrocarbon compounds having the same elements but a sim-

ilar difference, as in proportion. An isologous series or group.

Isomer. One of a group of substances having the same percentage composition and molecular weight, but differing in the arrangement of atoms or in characteristics.

Isomeric. Having the property of combining the same elements or atoms in the same proportion but in different arrangement.

Isomerism. The condition of having the same composition but different arrangement properties or characteristics.

Isomorphism. In crystallization the property of different compounds assuming the same crystalline form, but varying in composition.

K

Ketone. An organic compound of the hydrocarbon group produced by uniting two alcohol radicals by carbonyl (CO); or by transferring the oxygenated atom of an aldehyde from the terminal to one of the central atoms of the carbon-nucleus. Ketones are therefore isomeric with aldehydes, the atoms being definitely arranged.

Kinetic. Producing motion. Kinetic energy is the energy inherent in molecules, which causes them to move. In gases the kinetic theory maintains that the molecules of gases move in straight lines toward each other like elastic balls, bounding and rebounding with increased or diminished velocity according to temperature. At ordinary temperature and pressure molecules of air are supposed to move with the rapidity of a rifle bullet when it leaves the gun.

L

Lamella or Lamina. A thin scale. Used in describing crystals of scale form, as lameller, or laminate.

Latent Heat. The heat that is seemingly lost or apparently disappears is called the "Latent Heat" of the substance, each liquid or metal has its peculiar degree of latent heat; the latent heat of the vapor of a substance is the quantity of heat required to hold it in a gaseous state, and this is much higher than the latent heat of the substance itself. For example, the latent heat of water is

79.25°C. (142.65°F.), that is the heat which is lost or disappears when the water is converted into vapor, but the heat required to maintain the vapor in the form of steam is 537.-90°C., although in either case the boiling water or the steam only shows 100°C. by the thermometer. The heat which is absorbed by a substance without increasing its temperature, as when ice is melted into water or water converted into steam. Heat that is seemingly lost or apparently disappears when a change of state occurs in a substance. Each liquid or metal has its particular degree of latent heat.

Laxatives. Mild purgatives. Medicines that loosen the bowels without actively operating.

Levigation. The act of grinding substances to a very fine state of division, more particularly by rubbing them between flat surfaces when moist.

Liquid. A liquid is a fluid having a definite volume and surface and composed of particles which move freely among themselves in the mass which they compose. Compared with gases which are also fluids, liquids are non-elastic, while gases are compressible to a great extent. A liquid is one of the three states of matter, which is classed as gaseous, liquid or solid.

Local. In medicine having relation to a particular place or part, as local affection, local anæsthesia etc.; contrasting with general.

Luminosity. The property possessed by some substances of giving light; as phosphorus which is luminous when exposed to the air.

M

Magma. A moist precipitate. A moist mass, as the residue left after pressing fruit, or drugs after extraction etc.

Magnetic. Possessed of magnetism, as magnetic iron ore—the loadstone. Magnetic current, the electric current produced by a magnet. Magnetic force, the force in a magnet which attracts.

Mash. In distilling, the mixture of the ground grain and water which is fermented to develop the alcoholic spirit.

Mass. An assemblage or collection

of particles into one body; the entire quantity of a substance in one piece, pile or enclosure.

Matrass. A vessel intended for containing a liquid to be distilled, or a substance to be digested, the basic part of a distilling apparatus.

Mendelejeff's Periodic System. A system of classification of the elements in which they are arranged according to the increased value of their atomic weights. The Periodic Law corresponding with this system is that "The properties of elements (and their compounds) stand in periodic relation to their atomic weights."

Menstruum. A solvent used for extracting the soluble constituents of drugs. Alcohol, alcohol and water, ether, naphtha, oil, chloroform, water or other liquids may be employed as menstrua.

Meniscus. The surface of a liquid in a tube or bottle. It may be either slightly convex or concave by reason of capillary attraction. Often referred to in chemical tests.

Mercaptal. A chemical compound of a thiohydrate with an aldehyde.

Mercaptan. A hydrocarbon which is chemically combined with a sulphhydrate, as ethyl mercaptan, C_2H_5SH .

Metamerism. In chemistry a variety of isomerism in which bodies have the same percentage composition as well as the same molecular weight.

Metamorphosis. In chemistry a chemical change produced by the introduction of another substance into a compound.

Midriatics. Medicines which cause dilation of the pupil of the eye.
Midriasis.

Mixture. In pharmacy a preparation in which an insoluble substance is suspended in an aqueous or partly aqueous liquid or solution.

Mol. A term used to express a gramme molecule, which is a weight in grammes equal to the molecular weight of a substance. The molecular weight of sodium chloride is 58.5, therefore a mol, or gram molecule of it is 58.5 grams.

Molecule. The smallest particle of matter made up of a single combination of atoms; the combining unit of a substance made up of atoms. As an illustration take a grain of sand

as a substance, reduce it to the finest possible powder and assume that a single particle of the powder is a molecule, (this is only an assumption however, as the smallest particle is made up of thousands of molecules). This smallest particle has the same composition and chemical properties as the mass which was the grain of sand or the rock or mountain from which it originally came. It may therefore, be seen that a molecule is a single combination of atoms united in chemical proportions in which the attractions or affinities of the atoms are satisfied.

Molecular Weight. This is always the sum of the weights of the atoms that compose the molecules. For example, the molecule of water, (H_2O), is composed of 2 atoms of hydrogen (2) and 1 atom of oxygen (16), making the weight of the molecule of water 18. This will be the combining weight of water, into whatsoever relations or combinations it may enter.

Mother Liquor. The liquor remaining in a vessel after the crystallization of a salt.

Multiple Proportion. In chemistry a law is formulated called the law of multiple proportions. When the same amount of one substance combines with more than one amount by weight of another substance, all quantities of the second combining substance are multiples of the smallest.

Must. Freshly expressed juice of the grape, before fermentation.

Mycelium. The thread-like vegetable growth which forms in aqueous or dilute vegetable acid liquids.

Myotics. Medicines which cause contraction of the pupil of the eye,
Myosis.

N

Narcotics. Powerful medicines which cause sleep. Distinguished from are employed to relieve pain or anodynes and soporifics by being more powerful.

Nascent. In chemistry the uncombined state or condition of an atom or radical when set free from a combination and ready to enter into another combination, as nascent hydrogen, uncombined hydrogen, etc.

Nascent action, the beginning of action or being.

Neurotics. Medicines which act upon the nerves; intended to allay nervous excitement.

Neutral. In chemistry neither acid nor alkaline; a compound in which the affinity of the constituents is satisfied or equivalent.

Neutralize. To make neutral, either by the addition of acid or alkali.

Nomenclature. The system of naming substances or things according to certain characteristics or similarities which they suggest or possess is called "Nomenclature." Systems of this kind are very useful in the study and understanding of medicine, pharmacy, botany and chemistry; as when well understood, they greatly simplify these sciences.

Normal. Conforming to an established standard, natural; opposed to abnormal or unnatural, as normal temperature, normal solution, etc.

Nostrum. A prepared medicine or remedy of which the formula is not given or published. A secret medicine, as compared with a non-secret preparation—for which the formula is given or published.

Nutriants. Medicines intended to aid or modify nutritive processes or promote nutrition.

Nutrients. Substances used as food or nourishment for the system.

O

Occlusion. In chemistry the absorbing of gases by metals or other absorbents.

Ohm. The unit of electrical resistance. The resistance of 400 feet of common, iron telegraph wire is equal to about 1 ohm. The international ohm adopted by the international congress of 1893 is equal to the resistance of a column of mercury, at the freezing point of water, 1.063 centimetres in length and weighing 14.451 grams.

Osmose. The mixing or intermingling of two liquids or gases through a membranous or porous septum. See Dialysis.

Osteopathy. A recent treatment of disease by medication or by manipulation of the bones. This "pathy" assumes that all diseases proceed from diseased conditions or faulty

nutrition of the bony structure and aims to cure all ills through the bones. Colleges of osteopathy have been established and osteopathic physicians have been graduated and established in various parts of the country.

Ozone. A form of oxygen consisting of three atoms in the molecule. See Oxygen.

P

Pannus. An eye disease manifested by vascularity of the cornea, due to long continued irritation or chronic inflammation. It accompanies granulation of the eye-lids.

Papilloma. A general name for external abnormal growths, as warts, corns, horns and small hard protuberances on the skin.

Paraffin Series. A number of saturated hydrocarbons derived from methane or marsh gas, CH_4 , and having homologues to $\text{C}_{15}\text{H}_{32}$, constitute a series known as the paraffin or marsh gas series, having the formula, $\text{C}_n\text{H}_{2n+2}$.

Paralysis. Partial or complete loss of motor or sensory nerve power or control. It may be general or local and occurs in many forms.

Paranoia. A condition of monomania caused by gradual weakening of the mental balance and degeneracy.

Parasitic Affections. Due to the presence of parasites which fasten upon the person and cause disease or abnormal conditions.

Pasteurization. The heating of a fruit juice, solution or syrup to a degree which destroys germs of decomposition. This is variously from 140° to 175°F .

Pectoral Diseases. Diseases of the lungs, or affecting the lungs.

Pellet. A very small pill. The name is applied particularly to the small sugar pellets used in homœopathy.

Pellicle. A thin film or crust which forms on the surface of a solution of a salt when it is concentrated for the purpose of crystallization.

Percolate. The liquid obtained by percolation.

Pericarditis. Inflammation of the pericardium, the covering of the heart.

Periodic. In chemistry having the nature of a period, or recurrence in cycles. Periodic law.

Peristaltics. Medicines intended to promote peristaltic action of the bowels.

Peritonitis. Inflammation of the peritoneum. Formerly called inflammation of the bowels, which included all forms of intestinal inflammation.

Phagedœna. The extension of an ulcer with sloughing condition. *P. gangrenosa.* Hospital gangrene.

Pharyngitis. Inflammation of the pharynx.

Phlebitis. Inflammation of a vein.

Photophobia. Dislike or fear of light, applied to inflammatory conditions of the eye which are irritated by light.

Phthisis. A general name for consumption. *P. abdominalis*, *P. bulbi*, *P. pulmonaris*, *P. tuberculosis*.

Pill. In pharmacy the word pill may mean either a pilular mass or a made up pill.

Pityriasis. A general name for several forms of skin disease manifested by fine scales covering the diseased part.

Phlogiston. An old name for a principle supposed to be a constituent of all combustible substances and to be given up by them during the process of combustion.

Plants. 1. In botany a general name for all vegetable growths. 2. In a popular sense the small form of plants or herbs, distinguished from trees and shrubs which have a hard, woody structure and are of considerable size.

Plasma. 1. In pharmacy the glycerite of starch is called by this name. 2. The nutritive liquid circulating fluids of the system as the blood, lymph and intercellular fluid or the protoplasm which is the viscous material of a cell.

Plaster. In pharmacy this name applies either to the plaster mass or the spread plaster; also Plaster of Paris, dentists' plaster.

Pleurisy. Pleuritis. Inflammation of the pleura or covering of the lungs.

Pneumonia. A febrile inflammation of one or more lobes of the lungs. Formerly called inflammation of the lungs or lung fever.

Polariscope. An instrument for examining substances by polarized light. A special form of polariscope called the "sacchrometer" is used for

testing the saccharine strength of sugar.

Polarity. The property or quality possessed by a substance of having opposite poles, as a magnet. The poles of a magnet or battery are known as the positive and negative pole. In chemistry the poles of a magnet or battery attract atoms of an opposite electrical condition and repel those of a like electrical condition.

Polypus. A tumor, attached by a peduncle to the interior of the nose, ear, rectum etc.

Polyurea. Excessive secretion of the urine, distinguished from diabetes by being simply excessive in quantity.

Porrigo. A diseased condition of the scalp of which there are several forms, as impetigo, alopecia areata, favus etc.

Potentize. In homœopathy, to render potent or powerful, by attenuation or dynamization. To give potential energy.

Powder. A dry substance in a state of fine division. In pharmacy many simple and compound substances in the form of powder are employed. See fineness of powder.

Precipitate. An insoluble substance which settles in a liquid by standing.

Prescription. 1. A written order for a preparation of drugs. A formula written by a physician and intended to be prepared by a druggist. 2. The medicine prepared as directed by the writing or order of a physician. 3. A prescription for fitting glasses by an optician.

Preservative. An ingredient or compound added to juices, syrups, fruit or any preparation for the purpose of preserving it unchanged by fermentation or decomposition.

Prophylactics. Medicines intended to ward off or prevent the contracting of or the development of a disease, especially fevers and contagious diseases.

Prostatitis. Inflammation of the prostate gland.

Protectives. Medicines applied locally to protect a part.

Proteids. A class of very complex, usually amorphous, compounds consisting of carbon, hydrogen, oxygen, nitrogen and usually sulphur, found

in both animal and vegetable organisms, peptones and coagulated proteids are included in the classification. A proteid is one of the class, proteidæ.

Prurigo. A chronic disease of the skin marked by a thickened condition, and accompanied with intense and persistent itching.

Pruritis. A diseased condition of the skin or mucous membrane manifested by intense itching.

Psoriasis. A chronic inflammatory condition of the skin manifested by dry roundish patches covered by silvery scales and sometimes having a crust under which pus forms. Lep-ra: Alphos.

Ptomaine. An alkaloid, usually poisonous, produced by putrefaction.

Ptyalism. The excessive secretion of saliva, caused by drugs, as mercury, or from constitutional disturbances.

Puerpal fever. Child-bed fever. An acute contagious fever occurring to women in child-bed. Sometimes resulting in convulsions and mania.

Pulmonary affections. Affections of the lungs, as pulmonary consumption.

Purgatives. Medicines that cause free or copious discharge of the bowels.

Purulent. Having the character of pus or consisting of pus, as a purulent discharge.

Putrefaction. The condition of rotting, resulting from the action of putrefactive germs in the tissues; Putrescence. Putrid.

Pyæmia. Pus in the blood. Septicæmia caused by absorption of pus from internal abscesses, or malignant wounds. Blood poison.

Pyelitis. Inflammation of the pelvis of the kidney.

Pyrosis. Commonly called "heartburn." An acid condition of the stomach causing a burning sensation and eructation of gas.

Q

Quack. A medical pretender, an ignorant practitioner or empyric. Quack remedies or medicines are those prepared by pretenders, or claiming healing virtues or properties which they do not possess.

Quadrivalent. In chemistry having a combining power of four.

Qualitative. In chemical analysis, the determination of the ingredients of which a substance is composed without reference to their quantity or proportion. *

Quantitative. In chemical analysis, the determination of the quantity of an ingredient or ingredients of a compound.

Quantivalence. The same as Valence which is used instead in modern chemistry.

Quantivalent. Having the same valence or combining power.

Quinsy. A form of tonsillitis manifested by acute inflammation of the tonsils and mucous membrane of the fauces and frequently followed by supuration.

R

Rachitis. The same as rickets, which see.

Radiation. Emission of energy light or heat from a body into surrounding media.

Radical. In chemistry an atom or element, or a compound of atoms or elements which are not decomposed by ordinary chemical action, but act as a whole like an atom or elements; as an alkaloid radical, which, although associated with other substances remains constant.

Radicals are "simple" when composed of only one element, and "compound" when composed of more than one, as NH_4 , ammonium; C_2H_5 , ethyl.

Radio Activity. A force or energy derived from the lately discovered elements, radium, polonium, actinium and thorium, which give off light without, seemingly, losing their power in the least, and without being excited by heat, electricity or other known force. Radio activity possesses similar characteristics to the X rays and wonderful predictions are made concerning it, but it has not, as yet, been sufficiently investigated to determine its possibilities.

Reaction. In chemistry the interaction of chemical agents by which substances are separated or united in chemical compounds. In chemistry, action and reaction are synonymous terms.

Receiver. The part of a distilling apparatus which receives the distilled liquid.

Reduction. In chemistry the compression of a gas to a liquid, or the separation of a metal from its ore by melting or by similar acts or processes are called reduction.

Refrigerant. A substance which produces cold or a lowering of temperature, as a refrigerant or refrigerating mixture, etc.

Repercolation. See percolation and fluid extract.

Residue. A remainder left after pouring off the liquid part of a preparation, or what is left in the dish after evaporating a liquid, or what is left on a strainer or filter after the liquid has passed.

Retort. The part of a still which contains the substance to be distilled.

Revulsants. Medicines intended to draw the circulation of blood or nervous force from one part of the body, or from a diseased part to another locality, as by counter irritation.

Rheumatism. A disease manifested by shifting pain or neuralgia with sensitiveness to movement of the muscles or joints. Supposed to be caused by excess of uric acid in the system. Articular rheumatism, rheumatism of the joints.

Rhus poisoning. The poisoning by contact with or in presence of the poison-oak or -ivy, causing an eruption of the skin and swelling of soft parts of the body.

Rickets. A disease due to deficient or defective nutrition, occurring in childhood and manifested by softening of the spinal bones, causing deformity or twist of the spine.

Ringworm. A skin disease caused by a fungus parasite and manifested by circular patches with a red-den-ed edge in the form of a ring surrounding the patch.

Rubefacients. Medicines, which when applied cause redness and irritation and act as revulsants.

S

Saccharine. Having the properties of sugar, as saccharine solutions etc.

Salivation. The condition caused by the use of mercury or other drugs and manifested by greatly increased flow of saliva; ptyalism.

Salt. In chemistry a compound of a basic with an acid radical. Salts may

be neutral, acid or alkaline. Neutral salts are those in which the atoms of the basic and acid radical are each saturated or satisfied. Acid salts are those in which there is an excess of acid or an unsatisfied acid radical. Alkaline salts are those in which there is an excess of alkali or an unsatisfied basic radical.

Sarcoma. A tumor or a group of tumors composed of cell-elements, loosely connected with tissue. Any kind of fleshy excrescence as proud-flesh.

Saturation. In chemistry the combination of positive and negative atoms with each other until they are neutralized; or until their mutual attractions or affinities are satisfied. In pharmacy the state of being saturated as in the solution of a salt when no more of the salt will dissolve, or of a gas in water, when no more will be taken up, or of a solid which absorbs a gas or liquid until it is full to re-pletion.

Satyriasis. Leprosy, especially the form known as elephantiasis.

Scabies. The itch, caused by a parasite, the itch-mite. Scabies ferina is the name given to similar affections on domestic animals.: the mange.

Scalds. Burns with some heated liquid, as hot water, steam etc.

Scale or Scaled Salts. Salts or other medicaments that are dried on glass or porcelain plates in thin layers which, when removed, are in the form of scale, as the scale salts of iron, the soluble phosphate or citrate; pepsin in scale, etc.

Sciatica. Neuralgia of the hip and thigh caused by inflammation of the covering of the sciatic nerve.

Sclerosis. A morbid condition manifested by the hardening of a part or organ, as the brain or liver. Arterio-Sclerosis, hardening of the arteries.

Scrofula. A constitutional disease manifested by glandular swellings suppurating into ulcers or morbid sores, also developing into consumption of the lungs or bowels. Chiefly hereditary.

Scurvy. A disease characterized by scurf or scabs, occurring mostly in far northern countries where few vegetables are eaten.

Sea Sickness. The illness experienced by some on ship-board; distressing

- nausea retching, vomiting. Car sickness is similar.
- Sedatives.** Medicines which decrease functional activity, or which calm irritability or high nervous tension.
- Septicæmia.** A poisoned condition of the blood caused by absorption of septic matter from wounds or sores. Septic infection.
- Sequestrum.** In pathology the separation of a dead from a living bone, the dead bone remaining in its place.
- Series.** In chemistry a number of elements or compounds having similar characteristics or composition or increasing in a regular proportion, or having a constant difference of the same elements, as the benzene series, the paraffin series, etc.
- Shock.** A concussion or sudden collision. In pathology the paralysis of bodily functions from injury or operation. In electricity the passage of a strong electric current through the body.
- Sialagogues.** Medicines which promote the flow of saliva by exciting the salivary glands to action.
- Siphon.** A device for drawing liquids from a bottle, vessel or barrel by means of a tube, one end of which is inserted in the liquid and the other in a lower position arranged for the outflow. The air is drawn from the tube by suction and the liquid flows through it so long as the end that is in the liquid is higher than the end from which the liquid is discharged.
- Solid.** One of the states of matter distinguished from a gas or a liquid by having its molecules adherent to each other and immobile. A powder is a solid divided into minute particles, and all fixed masses or lumps of matter are solids.
- Solubility.** The degree or capacity of absorption of one substance by another, or the state of being soluble, as the solubility of salt in water, of an oil or resin in alcohol, of one metal in another, as in alloys; or of gas in a solid or liquid.
- Solution.** The combination of a solid with a liquid or a liquid with a solid, or a gas with either liquid or solid in which the form or character is changed and a liquid is produced which contains both of them; as a solution of salt in water, or camphor in alcohol, or an essential oil in alcohol or ether or another oil, or a mixture of camphor and chloral or a solution of carbon dioxide gas in water.
- Solvent.** The substance in which an article is dissolved, as water is a solvent for potassium iodide, alcohol is a solvent for castor oil, water is a solvent for ammonia gas etc.
- Solvency.** The degree of solubility of a menstruum, or the capacity which a substance has of being dissolved in a solvent.
- Somnifacients.** Medicines which induce sleep. Soporifics.
- Somnolence.** Sleepiness, drowsiness. Excessive desire to sleep.
- Soporifics.** Medicines intended to cause sleep. Somnifacients.
- Sorbefacients.** Medicines intended to cause absorption.
- Specifics.** Medicines that have a direct curative effect on certain diseases, as mercury is a specific for syphilis etc.
- Specific Gravity.** The weight of a substance in water as compared with its weight in air. See Specific Gravity.
- Specific Heat.** The heat required to raise the temperature of a given weight of a substance to a certain number of degrees, as compared with the heat required to raise the temperature of an equal weight of water the same number of degrees. The atomic weights of most elements, which cannot be readily volatilized, have been determined from their specific heat obtained in the manner described.
- Spectroscope.** An instrument for producing and analyzing the spectra of the rays emitted from substances in the form of vapor. Each element has its own peculiar spectrum, consisting of brightly and variously colored bands and lines, which are shown by the spectroscope. Many of the rare elements now known have been discovered by their spectra.
- Spectrum.** The image formed by the rays of light or radiant energy, emitted from a body, which may be shown by the spectroscope. Spectrum analysis is the method of determining the identity of a substance by the spectroscope.

Spermatorrhœa. Involuntary discharge of seminal secretions.

Spinal diseases. Any disease or lesions affecting the spine.

Sprain. A wrench of a joint or tendon, sometimes producing rupture of a ligament, but not dislocation. Swelling and pain of the sprained part.

Stimulants. Medicines which are intended to promote functional activity of an organ or of the general action of the body.

Stomachics. Medicines given to increase the appetite or promote digestion. Especially stimulants of the stomach.

Styptics. Medicines which contract the blood vessels and stop bleeding. Hæmostatics.

Sudorifics. Medicines intended to cause sweating or perspiration.

Sunburn. A partial destruction of the external skin by exposure to the rays of the sun. Temporary redness of the skin caused by the heat of the sun or by hot wind.

Surgery. The branch of healing science which relates to the treatment of disease by operations or appliances.

Sweating. The exudation of moisture or perspiration by the sweat ducts. This may be induced by drugs which are called sudorifics, or by mechanical processes.

Sycosis. An inflamed condition of the skin, affecting the hair follicles, commonly known as "barbers itch," due to a parasite which is communicated by shaving.

Symbols. In chemistry, letters, which stand for an elementary substance. These, quite generally, are the first or the first and second letters of the name of the element. If a single letter, it is a capital, as H for hydrogen; but if two letters, the second is a smaller letter as Ca for Calcium. In the formula for molecules the symbols are often associated with figures, as H_2O , water; or other characters as $(\text{H}_4\text{N})_2\text{CO}_3 \cdot \text{H}_2\text{O} = 114$, ammonium carbonate. The figures indicate that so many atoms of the substance with which they are associated are taken. If no figures appear a single atom only is meant, and if symbols are in parenthesis, followed by an inferior figure the entire

contents of the parenthesis is meant.

Syncope. Faintness, fainting fits, swooning with loss of consciousness, sensation and motion.

Synthesis. In chemistry the artificial production of a substance identical to one which has been naturally obtained. Synthetic urea was the first substance artificially produced, but now many substances that are naturally obtained from plants and animals are prepared synthetically. Synthetic perfumes and flavors are extensively used.

Syphilis. A disease caused by a germ or virus communicated by contact with a diseased person or by heredity. It manifests itself in various forms, on the skin, mucous membrane and on the soft tissues, muscles, bones and brain.

Systems. In botany, chemistry and medicine several systems of classification are employed. These systems are arrangements of things in the order of their characteristics or peculiarities or properties. They are referred to under other headings.

T

Tabes. A wasting away, characterized by emaciation, languor and general decline.

Tænicides. Tape-worm destroyers. Medicines intended to be taken to kill tape-worm.

Temperature. The condition of heat or cold, which may be measured in degrees by an instrument called a thermometer. Heat and cold are relative terms expressing the sensible condition of the atmosphere or any substance, as compared with a normal standard.

Absolute Temperature. See Absolute; also Temperature under Heat Measures.

Critical Temperature. This is the point at which a gas under pressure and cold, changes to a liquid. In the liquification of gases the critical point is that at which the substance changes to a gaseo-liquid state.

Tenesmus. Frequent desire to evacuate the bladder or bowels, accompanied with pain without being effectual. Generally caused by inflammation of the mucous membrane.

Terminal. An end or terminating point. In electrolysis either wire of

a battery or dynamo that dips into a solution to be analyzed. In a chemical compound an unsaturated atom to which another atom may be joined.

Test. An examination made to determine the ingredients of a compound, or the composition of a chemical. A test solution is one prepared for testing chemical substances.

Tetanus. Commonly called lockjaw. A nervous affection caused by a germ, the bacillus tetanus, and manifested by spasmodic rigid contraction of the muscles, of a part or all of the body.

Tetter. A vesicular skin disease, manifesting itself in various ways, as eczema, herpes etc. Scaly sores either dry or moist.

Theory. In chemistry a hypothesis or supposition that seems to be proven by facts, observed and experiment, as the "Atomic Theory," "Ampère's Theory," etc.

Thermometer. An instrument for indicating temperatures. Thermometers are explained under Heat Measures.

Clinical Thermometer. A small thermometer for taking the temperature of the body by inserting it in the mouth or other internal canal.

Thermostat. A device for regulating temperature by the expansion of a spring or other contrivance which automatically closes or opens a regulator or an electrical controlling device.

Thrush. A disease of fungus origin, affecting the mouth, lips and throat and manifested by round, pearl-colored vesicles that throw off white flakes or scabs. Usually confined to children.

Tic Dolooureux. Neuralgia of the face, usually accompanied with muscular twitchings.

Tinea. Ringworm. A form of parasitic skin disease usually in the form of a ring which gradually enlarges its circumference.

Tinnitus Aurium. Ringing of the ears, rearing sounds, as of falling water or cars.

Titration. The process of testing a chemical solution by adding a reagent which causes a precipitate or a change of color. The quantity of reagent used determines the amount

of the substance in the solution being tested.

Tonics. Medicines intended to give tone by stimulating organs to perform their proper functions.

Tonsillitis. Inflammation of the tonsils. Tonsilotomy, cutting away a portion of the tonsils.

Trachoma. A disease of the eye, generally known as granulated eyelids; granules of the inner surface of the lids, with inflammation.

Tremor. Trembling, shaking, or quivering as of palsy.

Trichinosis. A disease caused by trichinae in the muscles or intestines, and produced by eating the rarely cooked meat of infected animals, especially pork.

Trichosis. Abnormal deficiency of the hair.

Trismus. Spasmodic contraction as of the closing of the jaws in tetanus, or spasmodic and prolonged contraction of any muscle or part.

Triturate. A very fine powder prepared usually by triturating a powerful drug with an inert substance which acts as a diluent.

Trituration. The act of rubbing a substance or compound in a mortar until reduced to a very fine powder or a uniform liquid mixture.

Tuberculosis. A diseased condition, characterized by the formation of tubercles within some tissue or organ, the most common form being pulmonary tuberculosis.

Tumefactions. Swellings or abnormal rising up of a part, as in puffs.

Tumors. Swellings or bunches locally on any part of the body, or internally. Morbid growths.

Tympanitis. Tenseness or swelling of the abdomen caused by accumulation of gas.

Type. In chemistry, a representative compound to which other compounds of similar composition may be referred, as water is a type of a liquid, menthane is a typical gas etc.

U

Ulcers. Open sores either external or internal usually discharging pus and vitiated matter and generally having granulations.

Ultimate. Last or final, as the ultimate analysis of a substance, the ul-

timate reaction, the ultimate radical etc.

Ultra. Beyond, on the other side of, as the ultra-violet or chemical rays.

Union. In chemistry the condition of being united, as chemical union.

Uniform. In chemistry, substances which have a uniform composition, form or quality.

Urethritis. Inflammation of the Urethra, the canal by which urine is discharged from the bladder.

Urinary. Of or pertaining to the Urinary organs; as urinary diseases. Urinalysis, chemical analysis of the urine. Uric, derived from the urine, as uric acid.

Uterine. Of or pertaining to the uterus or womb; as uterine diseases, uterine displacement etc.

Urticaria. Nettle-rash, hives. A disease of the skin manifested by rounded elevations similar to wheals caused by a whip and attended by intense itching.

Uvula. Relaxed uvula, a condition of the uvula caused by lack of tone. Uvulotomy, the removal of a portion of the uvula by excision.

V

Vacuum. An enclosed space from which the air has been exhausted. Absolute Vacuum, see Absolute.

Vacuum Tube. A tube so arranged that the air can be exhausted during certain chemical operations.

Vacuum Pan. An apparatus for evaporating, so arranged that the air may be exhausted and thus allow the contents of the pan to be evaporated at a moderate heat. Used for making extracts, fluid extracts etc.

Vaginitis. Inflammation of the vagina of the female genitals.

Valence. The combining value of an element or radical. The valency of an element is its unit of combination. It may be univalent, bivalent, trivalent, quadrivalent, quintivalent, sextivalent etc. The valency of an element is sometimes expressed by points, as H*, O**, etc., sometimes by Roman numerals placed over the symbols etc. Sometimes by dashes, as in graphic formulas, as H—, —O—, etc., and more recently by plus or minus signs over or following the symbol, expressing, not only

the valency, but the positive or inactive power of the element.

The expression of valence in chemical formulas is not, however, generally customary, but only appears in textbooks to familiarize the student with valencies.

Some elements have more than one valence or combining value as phosphorus, which is either trivalent or quintivalent.

Vapor. Moisture or mist, any substance in gaseous form which is near its condensing point, or, in a wide sense, any gas that condenses to a liquid or solid at ordinary temperature. Distinguished from gas by requiring a higher degree of heat to keep it in gaseous form.

Vapor Density. The density of a substance in a state of vapor—the density increasing as the temperature lowers, until it becomes liquid. The density of a vapor as compared with air or hydrogen at the same temperature and pressure.

Vaporizer. An instrument that converts a liquid into a vapor, an atomizer.

Vaporize. To convert a substance into vapor.

Varices. Plural of varix, and meaning an enlargement or enlargements of blood vessels and other vessels of the circulating fluids of the body.

Varicose. Meaning abnormally dilated or developed as in varicose veins, varicocele etc.

Vermicides. Medicines intended to kill intestinal worms.

Verminose Affections. Relating to persons or animals afflicted with parasites or vermin.

Vermifuges. Medicines intended to expel internal worms, alive or dead.

Vesicatories. Applications intended to blister, as blister plaster, cantharidal collodion etc.

Vibration. The rapid movement, back and forth, of particles of matter. This is supposed to occur between the molecules of gases, and, in fact, all matter is supposed to be continually in a state of vibration, and that vibrations of the ether cause the phenomena of heat and light.

Vintage. The vinous product of a certain season is spoken of as the

vintage of the year in which it was produced as the "vintage of 1885" etc.

Vintner. One who has charge of the making of wine; also a wine merchant.

Viscid. Adhesive or sticky; a very thick fluid, as glucose, honey or tar.

Viscous. Having viscosity; as pitch or other thick semi-liquids.

Vitrious. Having properties or appearance similar to glass. Often mentioned in describing chemical substances.

Volatile. Having the property of rapid evaporation when exposed to the air, as alcohol, ether, benzine, chloroform and carbon disulphide. Volatile oils, essential oils, as distinguished from fixed oils which do not evaporate to any extent.

Volt. The electromotive force that will carry one ampère of current against a resistance of one ohm, or that will charge a condenser of one farad capacity with one coulomb of quantity. It is the practical unit of electromotive force, being slightly less than that of a Daniel cell.

W

Warts. On the human body small excrescences occurring on the face, hands or any part of the body. On horses, a hard, horny excrescence

naturally occurring on the pasterns. On plants, a hard, granular excrescence.

Watt. The rate at which work is done when one joule of energy is transferred or transformed per second is called the watt. It is a unit of electrical measurement equal to 0.00134 horse-power, or 0.737 foot-pounds per second. The Kilo-watt is 1000 watts, commonly abbreviated KW. in electrical work. The watt-hour is the electrical energy capable of working at the rate of one watt for one hour.

Whooping Cough. A communicable disease usually confined to children and characterized by a violent convulsive cough, occurring at intervals and ending with a whoop.

Y

Yaws. A contagious skin disease, usually occurring in the tropics.

Z

Zona. Shingles. A form of erysipelas which appears in zones or marked in a certain area with canals radiating from a central line.

Zymotic Diseases. Such diseases as occur from fermentation. Any epidemic or contagious disease caused or produced by fermentative process.

WEIGHTS AND MEASURES

Metrology is the name given to the science that treats of Weights and Measures, their systems and their units.

Weight is the measure of the Earth's attraction, or of the "pull" by which all material substances are drawn towards the center of the Earth by the law of attraction. Every substance, according to its nature, has its definite weight, according to its mass.

Formerly most every country had a system of weights and measures of its own, but commercial intercourse has greatly modified them and now the Metric System has been almost universally adopted for scientific purposes throughout the world.

In many countries, however, the modified, original systems are still retained and used commercially, regardless of the adoption of the Metric System, in authoritative text books. In the United States and Great Britain the introduction of the Metric System in pharmacy has been particularly slow and will continue to be, so long as other systems of weights and measures are commercially employed.

This, naturally, causes considerable confusion among works written in the English language for, with the exception of the grain, the denominations of weights and liquid measures used in pharmacy in the U. S. and Gt. Brit. do not, in a single instance, have the same value. The same condition prevails in values of corresponding weights and measures in other countries, but the native names are, generally, enough different to insure identification.

The following pages give a brief history of weights and measures used in the U. S. and Gt. Brit., and of the Metric System, now more or less used in all countries. Reference is also made to other weights and measures used in pharmacy in the principal nations.

EARLY HISTORY OF WEIGHTS AND MEASURES.

Edgar, one of the early Kings of England, in order to prevent frauds arising from diversity of measures, established in 972 standard measure to be used throughout his kingdom. Standard vessels, made by his order, were deposited in the city of Winchester, from whence originated the term "Winchester Measure," "Winchester Gallon," "Winchester Bushel." The original bushel is still preserved in the museum of that city.

Henry I., early in the 12th century, in order to prevent fraud in linear measure, ordered a standard yard to be made, the length of his own arm. This standard was deposited with the measures at Winchester. Standards of weight and measure were provided for the whole kingdom of England by the Sheriffs of London in 1197.

Henry III., in 1233, fixed the weight of an English ounce, decreeing that it should be 640 dry grains of wheat, and that twelve of these ounces should be a pound, and that eight pounds should be a gallon of wine.

Edward III. issued an order in 1353 that there should be "one weight, measure and yard" throughout the kingdom.

Henry VIII., in 1532, issued a statute directing the use of avoirdupois weight throughout Britain.

James I., in 1618, established troy weight in Britain.

Succeeding Sovereigns made more or less changes in weights and measures until in 1824, parliament settled the standards, making the troy pound 5760 grains, the avoirdupois pound 7000 grains and adopting the standard yard as the Imperial unit of measures of extension. Parliamentary copies of these standards are deposited in the Royal Observatory, Greenwich. The Standard Weights and Measures Act of Gt. Brit. was passed Aug., 1866, and a new act in 1878.

As the grain of wheat was chosen the unit for weight, so grains of barley were chosen the unit of linear measurement: 3 barley-corns made one inch, 12 inches one foot, 3 feet one yard, the length of Henry 1st's arm. From these primitive units emerged the systems of weights and measures adopted by the civilized world and commercially used today by the U. S., Gt. Brit. and some other nations, but destined, in the near future, to be replaced by the more scientific metric-decimal system, established by the French government in 1801.

Troy Weight.

The troy ounce was brought from Grand Cairo, Egypt, into Europe about the time of the Crusades, 1095, and was first adopted at Troyes, a city of France, from whence it derives its name. Troy weight was established in Britain by James I. in 1618, and was settled as a standard by parliament in 1824, the pound being 5760 grains, divided into twelve ounces, of 480 grains, and the ounce into twenty pennyweights, of 24 grains.

In the U. S., troy weight was adopted from the British standard and used in the U. S. P until 1880. The grain, ounce and pound are the same as apothecaries' weight. Troy weight is the standard weight of the U. S. mints and is used, generally, for weighing precious metals.

Apothecaries' Weight.

This weight is derived from troy weight, the grain, ounce and pound being the same; the scruple (20 grains) and the drachm (60 grains) being added, while the pennyweight (24 grains), of the troy system, is omitted. Sometime after James 1st established troy weight in Britain, (1618) apothecaries added the scruple and drachm and this was continued in the London, Edinburgh and Dublin colleges, after their establishment, and the London, Edinburgh and Dublin Pharmacopœias, up to their mergerment with the first British Pharmacopœia., published in June, 1864, when the avoirdupois system of weight was adopted. In the U. S. the apothecaries' system of weight has been in use by pharmacists since the early settlement of the country. It was adopted by the first pharmacopœias and continued in the several revisions until the sixth (1880), when parts by weight and (whenever weight was used) metric weight were directed. At the present time apothecaries' weight is mentioned in the U. S. P., but is not directed to be used; it is, nevertheless, quite generally used by physicians in writing prescriptions, and in formulas.

Avoirdupois Weight.

The avoirdupois ounce was introduced into Britain by the Romans, but the first statute directing its use in England was by Henry VIII., in 1532. Avoirdupois weight was settled as a standard by parliament in 1824, the pound being 7000 grains, divided into sixteen ounces of 437.5 grains. It is

the commercial and official weight of Gt. Brit., being directed by the Br. P., but is in no way recognized by the U. S. P., although it is used commercially in pharmacy and in all business transactions except in weighing the precious metals, when troy weight is used.

Apothecaries' Liquid Measure.

The Winchester gallon of 231 cubic inches, established by King Edgar in 972, is the standard for Apothecaries' Liquid Measure to this day. It is known as the wine gallon and is divisible into 4 quarts of 32 ounces, or 8 pints of 16 ounces, or 128 fl.ounces. The fluid ounce is equal to 8 fl. drachms or 480 minims. It is used in American pharmacy, but is not the same as the Imperial gallon of Gt. Brit. and its divisions, although named the same, are of different value than Imperial measure. It is recognized but not directed in the U. S. P., but is the commercial liquid measure of the United States, and is quite generally used in pharmacy and by physicians in prescriptions.

Imperial Weight and Measure.

The Imperial system of weights and measures is employed only in Great Britain and its dependencies. The present weights and measures were made standard by parliament in 1824. In general commercial transactions and in pharmacy, the avoirdupois pound of 7000 grains, divisible into 16 ounces of 437.5 grains, is used. In liquid measure, the gallon of 160 fluid ounces of water, equivalent at 62°F., to 10 pounds avoirdupois, is the unit; this is divisible into 4 quarts of 40 ounces, or 8 pints of 20 ounces. The ounce is divisible into 8 drachms or 480 minims. Avoirdupois weight and the Imperial fluid measure are equivalent. The fluid measure is not the same in any of its denominations as apothecaries' measure used in the U. S. The Imperial inch, foot and yard are the same as in the U. S.

Metric Weight and Measure.

Previous to the French Revolution no uniform system of weights and measures prevailed in France. The Roman pound and its subdivisions similar to apothecaries' weight, but of different values, and the *poids de marc*, and its divisions, having different values than the Roman, were both in use, leading to the same confusion as now prevails in U. S. pharmacy, owing to the use of the apothecary and avoirdupois systems.

On May 8, 1790, the French constituent assembly charged the Academy of Sciences with the organization of a better system, and a committee was named by the academy for that purpose, including Berthollet, Borda, Delambre, Lagrange, Laplace, Méchain and Prony. To Delambre and Méchain were assigned the measurements of an arc of the meridian between Dunkirk and Barcelona, and from their calculations the *mètre*,—which is the unit of metric measurement—was devised. The *mètre* represents one ten-millionth part of the distance from the equator to the pole, measured on the surface of the earth (a meridian). This is equal to 3.2808 English feet = 39.37 inches. This unit was adopted as the base of the metric system on April 7, 1795 and the physicist Borda, was authorized to construct a rod or bar, composed of platinum-iridium, representing the *mètre*. This was completed in 1799 and, together with the system, was officially adopted and made the only legal system, Nov. 2, 1801. The bar is known as "*Mètre des Archives*."

Notwithstanding the adoption of the metric system, other weights and measures continued in general use, until on July 4th, 1837, it was decreed that on and after Jan. 1, 1840, the metric and decimal system in its primitive simplicity should be used exclusively throughout France in all business transactions. Since then this system has been authorized and adopted in scientific calculations and works of nearly all civilized countries, and has been adopted altogether by many nations in commercial transactions;

but although legalized in the U. S. and Gt. Brit., it has not been adopted as the commercial system and, until it is, will not be greatly used by the general public.

An International Congress to promote the universal use of the Metric System was organized in 1872, and an International Convention of its representatives met in Paris in 1875. In 1878 the International Congress of Weights and Measures convened in Paris and organized an International Commission, establishing an International Bureau of Weights and Measures, near Paris.

This Bureau was established by the concurrent action of the principal governments of the world, and its building contains duplicates of the Mètre des Archives, the Kilogramme des Archives, and other standards of weight and measure. Prototypes of the Mètre rod or bar and of the Kilogramme are deposited in the United States National Bureau of Standards at Washington, D. C.

Linear, Surface and Cubic Measure.

Linear Measure of the U. S. and Gt. Brit. is based upon the standard yard of 1760, settled by parliament in 1824, and upon the Mètre adopted by the French Government in 1801. The standard yard is divisible into 3 feet, or 36 inches; at 62°F., the Brit. yard exceeds the U. S. yard by 0.00087 inch. The British yard standard is a brass rod into which two pins of gold are inserted: The upper surfaces of these pins are sunk to the half thickness of the bar and a small dot is made in the middle of each. The distance between these two dots on the gold pins, with the temperature 62°F., is the true yard. In the U. S. the standard yard is a brass copy of the English Standard made by Troughton of London. This is deposited in the office of Weights and Measures at Washington, D. C.

The Mètre=39.37079 inches, is 3.37 inches longer than the yard. It has been described under Metric Weight and Measure.

Surface Measure is the square of lineal dimensions. In pharmacy only small dimensions are generally required.

144 square inches=1 square foot=9.29 square decimetres.

9 square feet=1 square yard=0.836 square metres.

1 square metre (centare)=1550.06 square inches.

Cubic Measure is the cube of lineal measure. In pharmacy only small dimensions are generally employed.

1728 cubic inches=1 cubic foot.

27 cubic feet=1 cubic yard.

The litre is the unit for both wet and dry cubic measure; it is equal to 10 decilitres=1.05672 quarts U. S. measure. One cubic centimetre is equivalent to 1 gramme of distilled water at its greatest density. 1000 cubic centimetres=1 litre, 1000 grammes=1 kilogramme=2.20462 lbs., av.

The kilogramme represents the weight of one litre of distilled water at its greatest density, the measure of the cube of one-tenth of a metre.

The U. S. gallon=231 cubic inches=3.785 litres =3785.434 cubic centimetres.

The Imperial gallon=277.274 cubic inches=4.546 litres =4545.924 cubic centimetres.

Apothecaries' Weights.

Previous to 1880, Apothecaries' or troy weight was directed in the U. S. P. These weights were derived from the Old English troy weights and are, at the present day, quite generally used in this country in preparing formulas and prescriptions.

Grain (Gr.). The equivalent unit of apothecary, troy and avoirdupois weight.

1 gr. = $\frac{1}{20}$ apothecary scruple.

1 gr. = $\frac{1}{60}$ apothecary drachm.

1 gr. = $\frac{1}{480}$ apothecary ounce.

1 gr. = 0.0648 metric gramme.

1 gr. = 64.8 milligrammes.

Scruple (℥). An apothecary weight.

1 Sc. = 20 grains.

1 Sc. = $\frac{1}{3}$ apothecary drachm.

1 Sc. = $\frac{1}{24}$ apothecary ounce.

1 Sc. = 1.296 metric grammes.

The scruple is now seldom written in formulas or prescriptions, being expressed in grains instead; as 20 grains (1 Sc.), or 40 grains (2 Sc.).

Drachm (℥). An apothecary weight.

1 dr. = 60 grains.

1 dr. = 3 scruples.

1 dr. = $\frac{1}{8}$ apothecary ounce.

1 dr. = 3.888 metric grammes.

Ounce (℥). The apothecary ounce, the same as the troy ounce.

1 ounce = 480 grains.

1 ounce = 8 apothecary drachms.

1 ounce = 1.097 oz. avoird.

1 ounce = $\frac{1}{12}$ apoth. or troy pound.

1 ounce = 31.103 metric grammes.

Pound (lb.tr.). The apothecary and troy pound.

1 lb.tr. = 5760 grains.

1 lb.tr. = 12 apothecary ounces of 480 grains.

1 lb.tr. = 0.8228 lb. avoird.

1 lb.tr. = 13 oz. av. + 72.5 grains.

1 lb.tr. = 373.242 metric grammes.

In writing formulas or prescriptions the apothecary or troy pound is seldom directed unless large quantities are required. The weight is usually expressed in ounces instead.

Apoth. or Tr. Metric Approximate

12 ℥ = 5760 gr. = 373.242 gm. (375 gm.)

11 ℥ = 5280 gr. = 342.138 gm.

10 ℥ = 4800 gr. = 311.035 gm.

9 ℥ = 4320 gr. = 279.931 gm.

8 ℥ = 3840 gr. = 248.828 gm. (250 gm.)

7 ℥ = 3360 gr. = 217.724 gm.

6 ℥	= 2880 gr.	= 186.621 gm.
5 ℥	= 2400 gr.	= 155.517 gm.
4 ℥	= 1920 gr.	= 124.414 gm. (125 gm.)
3 ℥	= 1440 gr.	= 93.310 gm.
2 ℥	= 960 gr.	= 62.207 gm.
1 ℥	= 480 gr.	= 31.103 gm. (30 gm.)
8 ℥	= 480 gr.	= 31.103 gm.
7 ℥	= 420 gr.	= 27.215 gm.
6 ℥	= 360 gr.	= 23.327 gm.
5 ℥	= 300 gr.	= 19.440 gm.
4 ℥	= 240 gr.	= 15.552 gm. (16 gm.)
3 ℥	= 180 gr.	= 11.664 gm.
2 ℥	= 120 gr.	= 7.776 gm. (8 gm.)
1 ℥	= 60 gr.	= 3.888 gm. (4 gm.)
2 ℥	= 40 gr.	= 2.592 gm.
$\frac{1}{2}$ ℥	= 30 gr.	= 1.944 gm. (2 gm.)
1 ℥	= 20 gr.	= 1.296 gm.
$\frac{1}{4}$ ℥	= 15 gr.	= 0.972 gm. (1 gm.)
$\frac{1}{2}$ ℥	= 10 gr.	= 0.648 gm.

Grain.	Approx. Gm.	Approx. Milligm.
10	= 0.648 gm.	gm. = 650 mg.
9	= 0.583 gm.	gm. = 580 mg.
8	= 0.518 gm.	gm. = 520 mg.
$7\frac{3}{4}$	= 0.502 gm.	gm. = 500 mg.
$7\frac{1}{2}$	= 0.493 gm.	gm. = 500 mg.
7	= 0.454 gm.	gm. = 450 mg.
6	= 0.389 gm.	gm. = 390 mg.
5	= 0.324 gm.	gm. = 325 mg.
4	= 0.259 gm.	gm. = 250 mg.
$3\frac{1}{2}$	= 0.227 gm.	gm. = 225 mg.
3	= 0.194 gm.	gm. = 200 mg.
$2\frac{1}{2}$	= 0.162 gm.	gm. = 160 mg.
2	= 0.130 gm.	gm. = 125 mg.
$1\frac{1}{2}$	= 0.097 gm.	gm. = 100 mg.
1	= 0.065 gm.	gm. = 65 mg.
$\frac{7}{8}$	= 0.570 gm.	gm. = 60 mg.
$\frac{4}{5}$	= 0.052 gm.	gm. = 50 mg.
$\frac{3}{4}$	= 0.048 gm.	gm. = 45 mg.
$\frac{5}{8}$	= 0.041 gm.	gm. = 40 mg.
$\frac{1}{2}$	= 0.032 gm.	gm. = 30 mg.
$\frac{3}{8}$	= 0.025 gm.	gm. = 25 mg.
$\frac{1}{3}$	= 0.020 gm.	gm. = 20 mg.
$\frac{1}{4}$	= 0.0162 gm.	gm. = 16 mg.
$\frac{1}{5}$	= 0.0129 gm.	gm. = 10 mg.
$\frac{1}{8}$	= 0.0084 gm.	gm. = 8 mg.
$\frac{1}{10}$	= 0.0065 gm.	gm. = 5 mg.
$\frac{1}{15}$	= 0.0039 gm.	gm. = 4 mg.
$\frac{1}{20}$	= 0.0035 gm.	gm. = 3 mg.
$\frac{1}{30}$	= 0.0022 gm.	gm. = 2 mg.
$\frac{1}{40}$	= 0.0016 gm.	gm. = 1½ mg.
$\frac{1}{50}$	= 0.0013 gm.	gm. = 1¼ mg.
$\frac{1}{60}$	= 0.0011 gm.	gm. = 1 mg.
$\frac{1}{100}$	= 0.0006 gm.	gm. = 0.6 mg.
$\frac{1}{128}$	= 0.0005 gm.	gm. = 0.5 mg.
$\frac{1}{160}$	= 0.0004 gm.	gm. = 0.4 mg.
$\frac{1}{210}$	= 0.0003 gm.	gm. = 0.3 mg.
$\frac{1}{320}$	= 0.0002 gm.	gm. = 0.2 mg.
$\frac{1}{640}$	= 0.0001 gm.	gm. = 0.1 mg.

Avoirdupois Weight.

Avoirdupois weight is the commercial standard of the U. S. and Gt. Br., and is the standard of pharmaceutical weight of the Br. P. The Imperial system of weights and measures of Great Britain is avoirdupois weight and equivalent fluid measure.

Ounce (Oz.). The avoirdupois ounce. (av. oz.).

1 oz.=437½ grains.

1 oz.= $\frac{1}{16}$ avoirdupois pound of 7000 grains.

1 oz.=0.9115 ounce apothecary.

1 oz.= 28.349 metric grammes.

Pound (lb.av.). The avoirdupois pound.

1 lb.av.=7000 grains.

1 lb.av.= 16 avoirdupois ounces.

1 lb.av.=1.215 lb. tr.

1 lb.av.=1 lb., 2 ounces+280 grains apoth.

1 lb.av.= 435.592 metric grammes.

The Stone of avoirdupois weight is 14 pounds. This weight was formerly used throughout Great Britain and is now occasionally referred to, but is seldom used as a weight.

The Quarter (qr.) is equal to 2 stone, 28 pounds; 4 quarters make 1 hundred weight, (cwt.), 112 pounds. This weight was formerly very commonly used, and is still employed to some extent in Great Britain.

The Ton. 20 hundred-weight make 1 ton, 2,240 pounds, according to the old tables. This is still used in mining and is known as the miner's ton, or gross ton.

The metric ton is 1000 kilogrammes, equal to 2,204.6 pounds.

An avoirdupois drachm is also listed in tables of weights, but is never used in pharmacy. It is $\frac{1}{16}$ of the avoirdupois ounce of 437½ grains= $27\frac{11}{32}$ grains.

The avoirdupois pound is seldom directed in formulas or prescriptions unless considerable quantity is required. The weight is usually expressed in av. ounces, instead, at least up to three pounds (48 ounces).

The ton of avoirdupois weight is 2,000 pounds, the long ton 2,240 pounds, now seldom used in buying or selling. 40 cubic feet make 1 U.

S. shipping ton; wheat in bulk weighs 2,240 lbs. for 40 cubic feet. The shipping ton applies chiefly to marine shipments.

Avoirdupois Equivalents.

35 oz.+120 gr.=1000 Gm.

Avoir. ounces	grains	Metric Gm.	Avoir. pounds
32 oz.=14000	gr.=907.185	Gm.	2 lbs.
31 oz.=13562.5	gr.=878.835	Gm.	
30 oz.=13125	gr.=850.486	Gm.	$\frac{1}{8}$ lbs.
29 oz.=12687.5	gr.=822.136	Gm.	
28 oz.=12250	gr.=793.787	Gm.	$\frac{1}{4}$ lbs.
27 oz.=11812.5	gr.=765.437	Gm.	
26 oz.=11375	gr.=737.088	Gm.	$\frac{1}{2}$ lbs.
25 oz.=10937.5	gr.=708.738	Gm.	
24 oz.=10500	gr.=680.389	Gm.	$\frac{1}{2}$ lbs.
23 oz.=10062.5	gr.=652.039	Gm.	
22 oz.= 9625	gr.=623.690	Gm.	$\frac{1}{2}$ lbs.
21 oz.= 9187.5	gr.=595.340	Gm.	
20 oz.= 8750	gr.=566.991	Gm.	$\frac{1}{4}$ lbs.
19 oz.= 8312.5	gr.=538.641	Gm.	
18 oz.= 7875	gr.=510.291	Gm.	$\frac{1}{8}$ lbs.
17 oz.= 7437.5	gr.=481.942	Gm.	
16 oz.= 7000	gr.=453.592	Gm.	1 lb.
15 oz.= 6562.5	gr.=425.243	Gm.	
14 oz.= 6125	gr.=396.893	Gm.	$\frac{7}{8}$ lb.
13 oz.= 5687.5	gr.=368.544	Gm.	
12 oz.= 5250	gr.=340.194	Gm.	$\frac{3}{4}$ lb.
11 oz.= 4812.5	gr.=311.824	Gm.	
10 oz.= 4375	gr.=283.495	Gm.	$\frac{5}{8}$ lb.
9 oz.= 3937.5	gr.=255.146	Gm.	
8 oz.= 3500	gr.=226.796	Gm.	$\frac{1}{2}$ lb.
7 oz.= 3062.5	gr.=198.447	Gm.	
6 oz.= 2625	gr.=170.097	Gm.	$\frac{3}{8}$ lb.
5 oz.= 2187.5	gr.=141.784	Gm.	
4 oz.= 1750	gr.=113.398	Gm.	$\frac{1}{4}$ lb.
3 oz.= 1312.5	gr.= 85.049	Gm.	
2 oz.= 875	gr.= 56.699	Gm.	$\frac{1}{8}$ lb.
1 oz.= 437.5	gr.= 28.350	Gm.	
$\frac{7}{8}$ oz.= 382.8	gr.= 24.806	Gm.	
$\frac{3}{4}$ oz.= 327.1	gr.= 21.260	Gm.	
$\frac{5}{8}$ oz.= 273.4	gr.= 17.844	Gm.	
$\frac{1}{2}$ oz.= 218.8	gr.= 14.175	Gm.	
$\frac{3}{8}$ oz.= 164.0	gr.= 10.631	Gm.	
$\frac{1}{4}$ oz.= 109.4	gr.= 7.087	Gm.	
$\frac{1}{8}$ oz.= 54.4	gr.= 3.544	Gm.	
$\frac{1}{16}$ oz.= 27.3	gr.= 1.772	Gm.	

Metric Weights.

The metric system of weights and measures was made official in the 1890 U. S. P. and is now quite generally adopted as the official standard of civilized countries. The Br. P., however, retains the Imperial system, but in the 1898 revision gives the metric as alternative. The unit of metric weight is the gramme, and the denominations generally used in pharmacy are the milligramme (mg.), the gramme (gm.) and the kilogramme (kilo.).

Milligramme (mg.). The smallest metric weight = $\frac{1}{1000}$ gramme.

1 mg. = 0.0154 grain.

1 mg. = $\frac{1}{1000}$ gramme (0.001gm.)

Centigramme (cg.). A metric weight = $\frac{1}{100}$ gramme.

1 cg. = 0.154 grain.

1 cg. = $\frac{1}{100}$ gramme. (0.01 gm.).

Decigramme (dg.). A metric weight = $\frac{1}{10}$ gramme.

1 dg. = 1.543 grains.

1 dg. = $\frac{1}{10}$ gramme. (0.1 gm.).

Gramme (gm.). The unit of metric weight.

1 gm. = 15.4323 grains = 0.032 apoth.
 $\frac{7}{8}$ = 0.035 av. oz.

1 gm. = 10 decigrammes.

1 gm. = 100 centigrammes.

1 gm. = 1000 milligrammes.

1 gm. = $\frac{1}{1000}$ kilogramme.

1 gm. = $\frac{1}{100}$ hectogramme.

1 gm. = $\frac{1}{10}$ dekagramme.

A gramme is equivalent to the weight of a cubic centimeter of distilled water at its greatest density ($4^{\circ}\text{C}.$).

Note. U. S. silver coins issued since 1874 weigh: silver dollar, 25 gm.; half dollar, $12\frac{1}{2}$ gm.; quarter dollar, $6\frac{1}{4}$ gm.; dime, $2\frac{1}{2}$ gm. \$40 in subsidiary U. S. silver coin weigh 1 kilo. The 5 cent nickel weighs 5 gm. and is 2 cm. in diameter. These coins are very convenient for larger gramme weights. Unworn coins only, should be used.

Dekagramme (dg.). A metric weight = 10 grammes.

1 dg. = 154.32 grains = 0.35 oz. av.
 = 0.022 lb. av.

1 dg. = 10 grammes.

Hectogramme (hg.). A metric weight = 100 grammes.

1 hg. = 1543.23 grains = 3.53 oz. av.
 = 0.22 lb. av.

1 hg. = 100 grammes.

1 hg. = 10 dekagrammes.

Kilogramme (kg.). A metric weight = 1000 grammes.

1 kg. = 15432.35 grains = 35.27 oz. av.
 = 2.2 lbs. av.

1 kg. = 1000 grammes.

1 kg. = 100 dekagrammes.

1 kg. = 10 hectogrammes.

A kilogramme is equivalent to the weight of one liter of distilled water at its greatest density ($4^{\circ}\text{C}.$).

Metric. Grains. Approximate.

1 kilogramme = 1000 grammes.

1000 gm. = 15432.3 gr. ($35\frac{1}{4}$ oz. av.)

750 gm. = 11574.3 gr. ($26\frac{3}{8}$ oz. av.)

500 gm. = 7716.2 gr. ($17\frac{3}{8}$ oz. av.)

250 gm. = 3858.1 gr. ($8\frac{7}{8}$ oz. av.)

100 gm. = 1543.2 gr. ($3\frac{1}{2}$ oz. av.)

50 gm. = 771.6 gr. ($1\frac{3}{4}$ oz. av.)

25 gm. = 385.8 gr. ($\frac{7}{8}$ oz. av.)

14 gm. = 116.1 gr. ($\frac{1}{2}$ oz. av.)

7 gm. = 108.0 gr. ($\frac{1}{4}$ oz. av.)

5 gm. = 77.2 gr. ($1\frac{1}{4}$ drachm)

4 gm. = 61.7 gr. (1 drachm)

3 gm. = 46.2 gr. ($\frac{3}{4}$ drachm)

2 gm. = 30.8 gr. ($\frac{1}{2}$ drachm)

1 gm. = 15.4 gr. ($\frac{1}{4}$ drachm)

1 gm. = 1000 mg. = 15 gr.

0.75 gm. = 750 mg. = $11\frac{1}{2}$ gr.

0.65 gm. = 650 mg. = 10 gr.

0.50 gm. = 500 mg. = $7\frac{1}{2}$ gr.

0.40 gm. = 400 mg. = $6\frac{1}{5}$ gr.

0.33 gm. = 330 mg. = 5 gr.

0.25 gm. = 250 mg. = 4 gr.

0.20 gm. = 200 mg. = 3 gr.

0.16 gm. = 160 mg. = $2\frac{1}{2}$ gr.

0.125 gm. = 125 mg. = 2 gr.

0.100 gm. = 100 mg. = $1\frac{1}{2}$ gr.

0.065 gm. = 65 mg. = 1 gr.

0.050 gm. = 50 mg. = $\frac{3}{4}$ gr.

0.033 gm. = 33 mg. = $\frac{1}{2}$ gr.

0.025 gm. = 25 mg. = $\frac{3}{8}$ gr.

0.016 gm. = 16 mg. = $\frac{1}{4}$ gr.

0.010 gm. = 10 mg. = $\frac{1}{6}$ gr.

0.008 gm. = 8 mg. = $\frac{1}{8}$ gr.

0.005 gm. = 5 mg. = $\frac{1}{10}$ gr.

0.004 gm. = 4 mg. = $\frac{1}{16}$ gr.

0.003 gm. = 3 mg. = $\frac{1}{20}$ gr.

0.002 gm. = 2 mg. = $\frac{1}{30}$ gr.

0.001 gm. = 1 mg. = $\frac{1}{60}$ gr.

0.0006 gm. = 0.6 mg. = $\frac{1}{100}$ gr.

0.0005 gm. = 0.5 mg. = $\frac{1}{128}$ gr.

0.0004 gm. = 0.4 mg. = $\frac{1}{160}$ gr.

0.0003 gm. = 0.3 mg. = $\frac{1}{210}$ gr.

0.0002 gm. = 0.2 mg. = $\frac{1}{320}$ gr.

0.00015 gm. = 0.15 mg. = $\frac{1}{400}$ gr.

0.0001 gm. = 0.10 mg. = $\frac{1}{640}$ gr.

FLUID MEASURES.

Apothecaries' Fluid Measure.

This fluid measure is generally used as the commercial liquid measure in the United States. It is neither equivalent to Apothecary or Avoirdupois weight, and its terms and values are, therefore, somewhat confusing, but it is quite generally used in formulas and prescriptions, and in dispensing.

Note. The volume of water increases or diminishes, in varying ratio with the temperature. At 15.6°C. (60°F.) its volume is 1,000,928 as compared with 1,000,000 at its greatest density, 4°C. (39°F.). This difference is not important for ordinary calculations of pharmacy but, must be taken into account in exact scientific work. Metric measures are based upon the weight of distilled water at its greatest density 4°C. (39°F.) in vacuo. Imperial measures are based upon the weight of water at 62°F.

Minim (m.). U. S. $\frac{1}{480}$ part of the apothecary fluid ounce, equivalent to about 0.95 grain of distilled water.

1 m. U. S.=0.0615 cubic centimeter.

60 m. U. S.=1 apoth. fl.drachm.

480 m. U. S.=1 apoth. fl.ounce.

Fluidrachm (f3). U. S. 0.225 cubic inch, $\frac{1}{8}$ of the apothecary fluid ounce equivalent to 57.05 grains of distilled water, at its greatest density, in vacuo.

1 fl.dr. (f3). U. S.=60 U. S. minims.

1 fl.dr (f3). U. S.=3.697 gm. or Cc. water at 4°C.

8 fl.dr. (8 f3). U. S.=1 apothecary fl.ounce.

Fluidounce (f3), U. S. 1.805 cubic inch, $\frac{1}{16}$ of the apothecary pint, $\frac{1}{128}$ of the U. S. gallon. Equivalent to 456.392 grains of distilled water at its greatest density, in vacuo.

1 fl.ounce (f3), U. S.=8 fl.drachms.

1 fl.ounce (f3), U. S.=29.5737 gm. or Cc. water at 4°C.

16 fl.ounces (16f3), U. S.=1 U. S. pint.

128 fl.ounces (128 f3), U. S.=1 U. S. gallon.

Pint (O.), U. S.=28.875 cubic inches; $\frac{1}{8}$ of the U. S. gallon. The U. S.

pint corresponds to the apothecary fluid measure.

1 pint, U. S.=128 apothecary fl.dr.

1 pint, U. S.=16 apothecary fl.oz.

1 pint, U. S.=0.47318 liter.

1 pint, U. S.=473.18 Cc.

1 pint, U. S.=7302.26 grains distilled water at its greatest density, in vacuo.

The U. S. and Br. pints are entirely different in value, the U. S. pint being a little more than $\frac{4}{5}$ of the Imperial.

Quart (qt.), U. S. $\frac{1}{4}$ of the U. S. gallon. The quart is not recognized as an official measure, but is used commercially and in pharmacy.

1 qt., U. S.=32 apothecaries' fl.oz.

1 qt., U. S.=0.9463 liter.

The U. S. and Br. quarts are entirely different in value, the U. S. quart being a little more than $\frac{4}{5}$ of the Imperial.

Gallon (C.). U. S.=231 cubic inches. The standard from which are derived the apothecaries' fluid measures used in the United States.

1 gal., U. S.=128 apothecary fl.oz.

1 gal., U. S.=8 pints apothecary measure.

1 gal., U. S.=3.785434 liters.

1 gal., U. S.=3785.434 Gm. or Cc.

1 gal., U. S.=58418.1444 grains distilled water at its greatest density, in vacuo.

The U. S. standard is the Winchester gallon of 231 cubic inches. It is 0.8329 of the Imperial gallon of 277.274 cubic inches.

128 fl.ounces=3758.434 Cc.=1 U. S. gallon=3.785 liters.

33 fl.oz.+6 $\frac{1}{2}$ fl.dr.=1000. Cc.=1 liter.

33 fl.ounces=975.932 Cc.

32 fl.ounces=946.358 Cc.=1 apoth. qt. $\frac{1}{4}$ gal.

31 fl.ounces=916.785 Cc.

30 fl.ounces=887.211 Cc.

29 fl.ounces=857.637 Cc.

28 fl.ounces=828.064 Cc.

27 fl.ounces=798.490 Cc.

26 fl.ounces=768.916 Cc.

25 fl.ounces=739.343 Cc.

24 fl.ounces=709.769 Cc.= $\frac{3}{4}$ apoth. quart, 1 $\frac{1}{2}$ pint.

23 fl.ounces=680.389 Cc.

22 fl.ounces=650.821 Cc.

21 fl.ounces=621.048 Cc.

20 fl.ounces=591.474 Cc.

19 fl.ounces=561.900 Cc.
18 fl.ounces=532.327 Cc.
17 fl.ounces=502.753 Cc.
16 fl.oz.+7¼ fl.dr.=500 Cc.=½ liter.
16 fl.ounces=473.179 Cc.=1 apoth. pint, ⅓ gal.
15 fl.ounces=443.606 Cc.
14 fl.ounces=414.032 Cc.
13 fl.ounces=384.458 Cc.
12 fl.ounces=354.884 Cc.
11 fl.ounces=325.311 Cc.
10 fl.ounces=295.737 Cc.
9 fl.ounces=266.163 Cc.
8 fl.oz.+3⅝ fl.dr.=250 Cc.=¼ liter.
8 fl.oz.=236.590 Cc.=½ apoth. pint. ⅓ gal.
7 fl.ounces=207.016 Cc.
6 fl.ounces=177.442 Cc.
5 fl.ounces=147.869 Cc.
4 fl.ounces=118.295 Cc.=¼ apoth. pint, ⅓ gal.
3 fl.ounces= 88.721 Cc.
2 fl.ounces= 59.147 Cc.
1 fl.ounce = 29.573 Cc.

8 fl.dr.=29.573 Cc.=1 apoth. fl.oz.
7 fl.dr.=25.875 Cc.=⅞ apoth. fl.oz.
6 fl.dr.=22.179 Cc.=¾ apoth. fl.oz.
5 fl.dr.=18.482 Cc.=⅝ apoth. fl.oz.
4 fl.dr.=14.785 Cc.=½ apoth. fl.oz.
3 fl.dr.=11.088 Cc.=⅓ apoth. fl.oz.
2 fl.dr.= 7.392 Cc.=¼ apoth. fl.oz.
1 fl.dr.= 3.697 Cc.=⅑ apoth. fl.oz.
60 minims=3.697 Cc.=1 apoth. fl.dr.
50 minims=3.081 Cc.
45 minims=2.772 Cc.=¾ apoth. fl.dr.
40 minims=2.464 Cc.
35 minims=2.156 Cc.
30 minims=1.848 Cc.=½ apoth. fl.dr.
25 minims=1.540 Cc.
20 minims=1.232 Cc.
15 minims=0.924 Cc.=¼ apoth. fl.dr.
10 minims=0.616 Cc.
5 minims=0.308 Cc.
4 minims=0.246 Cc.
3 minims=0.185 Cc.
2 minims=0.123 Cc.
1 minim =0.062 Cc.=1/480 apoth. fl.oz.

Imperial Fluid Measures.

Imperial Fluid measure is generally used in Great Britain and its dependencies as the commercial and pharmaceutical standard. It is equivalent with avoirdupois weight, but does not correspond with the U. S. apothecary weight or measure.

Minim (min.). Br. 1/480 part of the Imperial fluid ounce, equivalent to about 0.91 grain of distilled water.

1 Min. Br.=0.059 Cc.

60 Min. Br.=1 Imperial fl.drachm.

480 Min. Br.=1 Imperial fl.ounce.

In the Br. P. 110 minims of water at 62°F. are taken as the value of 100 grains.

Fluid drachm (fl. drm.). Br. 0.216 cubic inch, ⅙ of the Imperial fluid ounce, equivalent to 54.6875 grains of distilled water at 62°F.

1 fl.drm. Br.=3.552 cubic cent.

8 fl.drm. Br.=1 Imperial fl.ounce.

Fluid ounce (fl. oz.). Br. 1.733 cubic inches, 1/20 of the Imperial pint, 1/160 of the Imperial gallon, equivalent to 437.5 grains of distilled water at 62°F.

1 fl.oz. Br.=8 Imperial fl. drachms. (480 minims.)

1 fl.oz. Br.=28.417 Cc. or 0.028-4123 liter.

20 fl.oz. Br.=one Imperial pint.

160 fl.oz. Br.=one Imperial gallon.

The Imperial fluid ounce is a little less than the apothecary; 24 U. S. apothecary fluid ounces=25 Br. Imp. fluid ounces+1 grain.

The Imperial fl.oz. is equivalent to the avoirdupois ounce, that is, one ounce of distilled water at 62°F. weighs 1 ounce avoirdupois.

Pint (O.). Br.=34.659 cubic inches; ⅙ of the Imperial gallon.

1 Imp. pint, Br.=20 Imp. fl.oz.

1 Imp. pint, Br.=0.5682454 liter.

1 Imp. pint, Br.=568.336 Cc.

1 Imp. pint, Br.=8750 grains=1¼ pounds av., distilled water at 62°F.

The Br. and U. S. pints are entirely different in value. The Imperial pint being nearly ¼ greater than the apothecary.

Quart (qt.). Br. 1/2 of the Br. Imperial gallon. It is not recognized as an official measure in the Br. P., but is used commercially.

1 qt. Br.=40 Imperial fl.ounces.

1 qt. Br.=1.1366 liters.

The Br. and U. S. quarts are entirely different in value; the Imperial quart being nearly ¼ greater than the apothecary.

Gallon (C.). Br. Imperial gallon=277.274 cubic inches. The standard of the Imperial fluid measures used in Great Britain.

1 Imp. gal. Br.=160 Imp. fl.oz.
1 Imp. gal. Br.=4.5459631 liters.
1 Imp. gal. Br.=4545.9631 Cc.
1 Imp. gal. Br.=70,000 grains = 10 pounds av., distilled water at 62° F.
The Imperial gallon=1.2003 (1 $\frac{1}{5}$) U. S. gallons.
160 fl.oz.=4545.963 Cc.=1 Imp. gallon =4.546 liters.
40 fl.oz.=1138.990 Cc.=1 Imp. qt.
35 $\frac{1}{4}$ fl.oz.=1000 Cc.=1 liter.
32 fl.oz.= 907.185 Cc.
28 fl.oz.= 793.787 Cc.
34 fl.oz.= 680.389 Cc.
20 fl.oz.= 568.2454 Cc.=1 Imp. pint.
16 fl.oz.= 453.592 Cc.
15 fl.oz.= 425.243 Cc.
14 fl.oz.= 396.893 Cc.
13 fl.oz.= 368.544 Cc.
12 fl.oz.= 340.194 Cc.
11 fl.oz.= 311.854 Cc.
10 fl.oz.= 283.495 Cc.= $\frac{1}{2}$ Imp. pint.
9 fl.oz.= 255.146 Cc.
8 fl.oz.= 226.796 Cc.
7 fl.oz.= 198.447 Cc.
6 fl.oz.= 170.097 Cc.
5 fl.oz.= 141.748 Cc.= $\frac{1}{4}$ Imp. pint.
4 fl.oz.= 113.398 Cc.
3 fl.oz.= 85.049 Cc.
2 fl.oz.= 56.699 Cc.
1 fl.oz.= 28.350 Cc.
8 fl.dms.=28.350 Cc.
7 fl.dms.=24.806 Cc.
6 fl.dms.=21.262 Cc.
5 fl.dms.=17.718 Cc.
4 fl.dms.=14.174 Cc.
3 fl.dms.=10.630 Cc.
2 fl.dms.= 8.036 Cc.
1 fl.dm. = 3.542 Cc.
60 Imp. minims=3.542 Cc.
50 Imp. minims=2.952 Cc.
40 Imp. minims=2.361 Cc.
30 Imp. minims=1.771 Cc.
20 Imp. minims=1.181 Cc.
10 Imp. minims= .590 Cc.
5 Imp. minims= .295 Cc.
4 Imp. minims= .236 Cc.
3 Imp. minims= .177 Cc.
2 Imp. minims= .118 Cc.
1 Imp. minim = .059 Cc.

Metric Fluid Measures.

Metric fluid measure corresponds with metric weight of water at its greatest density. Its unit is the liter and the denominations generally used are the Cc. and the l., other denominations are seldom used in pharmacy.

Note. Meter and Liter and divisions of Metric weight and measure ending in meter or liter are spelled meter and liter in the U. S. P., but in the French, British and other pharmacopœias the original French orthography is followed—*metre*, *litre*, etc. They are the same under either spelling.

Cubic Centimeter (Cc.). A metric measurement= $\frac{1}{1000}$ liter; also called a *milliliter*; a cube whose edge measures $\frac{1}{100}$ of a meter and which contains one gramme of distilled water at its greatest density.

1 Cc.=16.25 minims, U. S.=0.032 apothecary f.ounces.

1 Cc.=16.9 minims, Br.=0.035 Imperial f.ounce.

1 Cc.= $\frac{1}{10}$ centiliter.

1 Cc.= $\frac{1}{100}$ deciliter.

1 Cc.= $\frac{1}{1000}$ liter.

Centiliter (cl.). A metric measure= $\frac{1}{100}$ liter.

1 cl.=162.5 minims, U. S.=0.32 apothecary f.ounce.

1 cl.=169 minims, Br.=0.35 Imperial f.ounce.

1 cl.=10 cubic centimeters.

1 cl.= $\frac{1}{100}$ liter.

Deciliter (dl.). A metric measure= $\frac{1}{10}$ liter.

1 dl.=1625 minims, U. S.=3.28 apothecary f.ounces.

1 dl.=1690 minims, Br.=3.53 Imperial f.ounces.

1 dl.=100 cubic centimeters.

1 dl.= $\frac{1}{10}$ liter.

Liter (l.). The unit of metric fl. measure. A liter of distilled water at its greatest density weighs 1000 gm. or 1 kilogramme.

1 l.=16255 minims, U. S.=33.86 apothecary f.ounces.

1 l.=16897 minims, Br.=35.27 Imperial f.ounces.

1 l.= 1000 Cubic centimeters.

1 l.= 100 centiliters.

1 l.= 10 deciliters.

The liter is represented by the cube of one-tenth of a meter=a cubic deciliter.

Dekaliter (Dl.). A metric measure=10 liters.

1 Dl.=2.64 U. S. gallons.

1 Dl.=10 liters.

1 Dl.=100 deciliters.

1 Dl.=1000 centiliters.

1 Dl.=10,000 cubic centimeters.

Hectoliter (Hl.). A metric measure
=100 liters.

1 Hl.=26.42 U. S. gallons.

1 Hl.=100 liters.

1 Hl.=1000 deciliters.

1 Hl.=10000 centiliters.

1 Hl.=100000 cubic centimeters.

Kiloliter (Kl.). A metric measure=
1000 liters.

1 Kl.=264.18 U. S. gallons.

1 Kl.=10 hectoliters.

1 Kl.=100 dekaliters.

1 Kl.=1000 liters.

1 Kl.=1000000 cubic centimeters.

Metric	Approx. Apoth.
Fl. Measure.	Fl. Measure

1 Liter=1000 Cc.=15432.4 grains.

Cc.	fl.oz. + minims	fl.oz.
1000 Cc.=33	390.6=about	33.81
975 Cc.=33	314.5=about	33 $\frac{3}{4}$
950 Cc.=32	259.1=about	32 $\frac{3}{4}$
925 Cc.=31	133.3=about	31 $\frac{1}{4}$
900 Cc.=30	207.6=about	30 $\frac{3}{4}$
875 Cc.=29	281.8=about	29 $\frac{3}{4}$
850 Cc.=28	356.0=about	28 $\frac{3}{4}$
825 Cc.=27	430.3=about	27 $\frac{7}{8}$
800 Cc.=27	24.5=about	27
775 Cc.=26	98.7=about	26 $\frac{1}{2}$
750 Cc.=25	173.0=about	25 $\frac{1}{3}$
725 Cc.=24	247.2=about	24 $\frac{1}{2}$
700 Cc.=23	321.4=about	23 $\frac{3}{4}$
675 Cc.=22	359.7=about	22 $\frac{7}{8}$
650 Cc.=21	469.9=about	22
625 Cc.=21	64.1=about	21 $\frac{1}{8}$
600 Cc.=20	138.4=about	20 $\frac{1}{4}$
575 Cc.=19	212.6=about	19 $\frac{1}{2}$
550 Cc.=18	286.6=about	18 $\frac{3}{4}$
525 Cc.=17	361.1=about	17 $\frac{3}{4}$
500 Cc.=16	435.3=about	16 $\frac{7}{8}$
475 Cc.=16	29.6=about	16
450 Cc.=15	103.8=about	15 $\frac{1}{3}$
425 Cc.=14	178.0=about	14 $\frac{3}{8}$
400 Cc.=13	252.3=about	13 $\frac{1}{2}$
375 Cc.=12	326.5=about	12 $\frac{3}{4}$
350 Cc.=11	400.7=about	11 $\frac{7}{8}$
325 Cc.=10	475. =about	11
300 Cc.=10	69.2=about	10 $\frac{1}{8}$
275 Cc.= 9	143.4=about	9 $\frac{1}{4}$
250 Cc.= 8	217.7=about	8 $\frac{1}{2}$
225 Cc.= 7	291.9=about	7 $\frac{3}{4}$
200 Cc.= 6	366.1=about	6 $\frac{3}{4}$
175 Cc.= 5	440.4=about	5 $\frac{7}{8}$
150 Cc.= 5	34.6=about	5
125 Cc.= 4	108.8=about	4 $\frac{1}{4}$
100 Cc.= 3	183.1=about	3 $\frac{3}{8}$
90 Cc.= 3	20.8=about	3 $\frac{1}{3}$
80 Cc.= 2	338.5=about	2 $\frac{3}{4}$
75 Cc.= 2	257.3=about	2 $\frac{1}{2}$

70 Cc.= 2	176.1=about	2 $\frac{3}{4}$
60 Cc.= 2	13.8=about	2
50 Cc.= 1	331.5=about	1 $\frac{3}{4}$
40 Cc.= 1	169.2=about	1 $\frac{3}{8}$
30 Cc.= 1	6.9=about	1
25 Cc.=	405.7=about	$\frac{7}{8}$
20 Cc.=	324.6=about	$\frac{3}{4}$
15 Cc.=243.5	min. about 4	fl.dr.
13 Cc.=211.0	min. about 3 $\frac{1}{2}$	fl.dr.
11 Cc.=178.5	min. about 3	fl.dr.
10 Cc.=162.3	min. about 2 $\frac{3}{4}$	fl.dr.
9 Cc.=146.1	min.	
8 Cc.=129.8	min.	
7 Cc.=113.6	min.	
5 Cc.= 81.2	min.	
4 Cc.= 64.9	min. about 1	fl.dr.
3 Cc.= 48.7	min.	
2 Cc.= 32.5	min. about $\frac{1}{2}$	fl.dr.
1 Cc.= 16.25	min. about $\frac{1}{4}$	fl.dr.

Measures of Length.

The linear measures of the U. S. were derived from the Old English yard and its divisions, and are the same in the U. S. and Gt. Br.

Metric measures of length are from the metre and its divisions, and are official in the U. S. P., also alternative in the Br. P. These standards have been described under other headings.

English Standard.

Inch (in.). A standard measure of length.

1 in.= $\frac{1}{12}$ of a foot.

1 in.= $\frac{1}{36}$ of a yard.

1 in.=0.0254 meter.

1 in.=2.54 centimeters.

1 in.=25.40 millimeters.

Foot (ft.). A standard measure of length.

1 ft.=12 inches, or $\frac{1}{3}$ yard.

1 ft.=0.3048 meter.

1 ft.=3.048 decimeters.

1 ft.=30.49 centimeters.

Yard (yd.). The U. S. and Br. Standard of length.

1 yd.=36 inches or 3 feet.

1 yd.=0.91438 meter.

Metric Standard.

Millimeter (mm.). The smallest division of the metric length.

1 mm.= $\frac{1}{1000}$ meter.

1 mm.= $\frac{1}{100}$ centimeter.

1 mm.= $\frac{1}{10}$ decimeter.

1 mm.=0.0394 inch.

Centimeter (cm.). A metric measure of length.

- 1 cm. = $\frac{1}{100}$ meter.
- 1 cm. = $\frac{1}{10}$ decimeter.
- 1 cm. = 0.3937 inch

Decimeter (dm.). A metric measure of length.

- 1 dm. = $\frac{1}{10}$ meter.
- 1 dm. = 3.937 inches.

Meter (m.). The metric standard unit of length.

- 1 m. = 10 decimeters.
- 1 m. = 100 centimeters.
- 1 m. = 1000 millimeters.
- 1 m. = 39.37 inches = 3.28 feet.
- 1 m. = 1.0936 yard = (1 yard + 3.37 inches).

Surface Measure.

The measure of area, which is space in two dimensions, is generally called surface measure. In the U. S. and Gt. Brit. the Old English measure based on the square yard is generally used.

Metric surface measures are based upon the mètre unit, and are squares of the linear measurements.

English Surface Measure.

Square inch (sq.in.).

- 1 sq.in. = $\frac{1}{144}$ of a square foot.
- 1 sq.in. = $\frac{1}{1296}$ of a square yard.
- 1 sq.in. = 64.52 square millimeters.
- 1 sq.in. = 6.452 square centimeters.
- 1 sq.in. = 0.645 square decimeter.
- 1 sq.in. = 0.0645 square meter.

Square foot (sq.ft.).

- 1 sq.ft. = 144 square inches.
- 1 sq.ft. = $\frac{1}{9}$ square yard.
- 1 sq.ft. = 9.29 square decimeters.
- 1 sq.ft. = 92.90 square centimeters.
- 1 sq.ft. = 0.093 square meter.

Square yard (sq.yd.).

- 1 sq.yd. = 9 sq. feet = 1296 sq. inches.
- 1 sq.yd. = 0.836 square meter.

Metric Surface Measure.

Square millimeter (sq.mm.).

- 1 sq.mm. = $\frac{1}{1000000}$ square meter.
- 1 sq.mm. = $\frac{1}{100000}$ square decimeter.
- 1 sq.mm. = $\frac{1}{10000}$ square centimeter.
- 1 sq.mm. = 0.00155 square inch.

Square centimeter (sq.cm.).

- 1 sq.cm. = $\frac{1}{10000}$ square meter.
- 1 sq.cm. = $\frac{1}{1000}$ square decimeter.
- 1 sq.cm. = 0.155 square inch.

Square decimeter (sq.dm.).

- 1 sq.dm. = $\frac{1}{100}$ square meter.
- 1 sq.dm. = 100 square centimeter.
- 1 sq.dm. = 15.50 square inches.

Square meter (sq.m.). Also called *Centare*.

- 1 sq.m. = 1,000,000 sq. millimeters.
- 1 sq.m. = 10,000 sq. centimeters.
- 1 sq.m. = 100 sq. decimeters.
- 1 sq.m. = 1550.06 sq. inches.
- 100 sq.m. = 1 are = 1076.43 sq. feet.
- 10,000 sq.m. = 1 hectare = 2.4714 acres.

Cubic Measure.

Cubic measure is measure of mass, the three dimensions of mass—length, breadth and thickness—are multiplied together and equal the cubic contents of the mass.

English Cubic Measure.

Cubic Inch (cu.in.).

- 1 cu.in. = $\frac{1}{1728}$ cubic foot.
- 1 cu.in. = 16.387 cubic centimeters.
- 1728 cu.in. = 1 cubic foot.
- 231 cu.in. = 1 U. S. wine gallon.
- 277.274 cu.in. = 1 Br. Imperial gallon.

Cubic Foot (cu.ft.).

- 1 cu.ft. = $\frac{1}{27}$ cubic yard.
- 1 cu.ft. = 1728 cubic inches.
- 1 cu.ft. = 28.307 cubic decimeters.
- 1 cu.ft. = 0.0283 cubic meter.

Cubic Yard (cu.yd.).

- 1 cu.yd. = 27 cubic ft. = 46,656 cu.in.
- 1 cu.yd. = 0.7645 cubic meter.

Metric Cubic Measure.

Cubic Centimeter (Cc.).

- 1 Cc. = $\frac{1}{1000}$ cubic decimeter (or liter).

- 1 Cc. = 1 gm. (dist. water at 4°C.).
- 1 Cc. = 0.061 cubic inch.

Cubic Decimeter (cu.dm.).

- 1 cu.dm. = 1 liter = 100 cu. centiliters.
- 1 cu.dm. = 1000 Cc. or gm. (dist. water at 4°C.).
- 1 cu.dm. = 62.45 cubic inches.

Cubic Meter (Cu.M.).

- 1 Cu.M. = 1,000,000 cubic centimeters.
- 1 Cu.M. = 1000 cubic decimeters.
- 1 Cu.M. = 35.315 cubic feet.
- 1 Cu.M. = 1.309 cubic yards.

SPECIFIC WEIGHT OR GRAVITY.

Specific Gravity or Weight differs from ordinary gravity or weight by taking into account the space or volume occupied by a substance, for example: A pound of aluminum occupies about seven and one-half times as much space as a pound of gold; a pint of mercury weighs about thirteen and one-half times as much as a pint of water; a volume of oxygen weighs about sixteen times as much as an equal volume of hydrogen at the same pressure and temperature. Every substance has its specific weight proportionate to the space or volume it occupies, and specific gravity is the weight of a substance compared with the weight of another substance occupying the same space or volume, taken as a standard.

In the practice of Pharmacy, Specific Gravity is of great importance in testing spirits, acids, oils, solutions, syrups, etc., not only for verifying their strength or purity, but in the manufacture of many preparations to bring them to a definite standard.

EARLY HISTORY OF SPECIFIC GRAVITY.

The great principle upon which specific gravity is based was discovered by Archimides about 250 B. C. King Hiero II., of Syracuse, had given a certain amount of gold to an artist to be made into a crown. When the crown was delivered he suspected that it had been alloyed with a baser metal and he commissioned Archimides to discover if that had been done. At that time no method of determining this was known and he was greatly puzzled over the matter, but happening one day to go to his bath, as he stepped into the tub, which had been well filled, the water overflowed. This suggested to him the solution of the problem, and he was so excited and overjoyed that he ran home without his clothes, shouting "Eureka! Eureka! I have found it! I have found it!" Thereupon he accurately weighed the crown and immersed it in a vessel completely filled with water, the overflow representing a volume equal to the mass of the crown; then he took an amount of gold of the same weight as the crown and immersed it in the same vessel filled as before with water. The difference in the specific weight of the masses of metal was determined by the overflow or displacement of the water, and the principle of specific gravity was established.

It was but a step for the mechanical mind of Archimides to demonstrate, by the balance, that the difference of weight in and out of water represented the weight of water displaced by the solid, and that the weight of the solid out of water, divided by the difference of its weight in water, gave its specific weight, density or mass, compared with water as a standard.

This discovery soon led to the construction of the specific gravity bottle, by which the weight of liquids could be compared with the weight of an equal volume of water, thus determining their specific gravity.

The hydrometer seems to have been but little known to the ancients. One writer mentions an instrument similar to a hydrometer, used some 300 years after the time of Archimides; another more reliable historian, attributes its invention to Hypatia of Alexandria, about 380 A. D., but no other reference seems to be made until it was "re-invented" by Robert Boyle and described as a "New Essay Instrument" in the Philosophical Transactions for June, 1675. Since this time Hydrometers of various construction and for various purposes have come into very general use; but for scientific purposes the hydrostatic balance and the specific gravity bottle, or pycnometer, are most reliable. Further information about hydrometers will be found in the article on Hydrometry.

Specific Weight or Gravity.

Specific weight or gravity is the relative weight or density of a mass or volume of a substance compared with an equal mass or volume of some other substance, at the same temperature, taken as a standard. Distilled water is the standard for comparison of solids and liquids, and air or hydrogen the standard with which gases are compared.

Temperature and atmospheric pressure are both important in determining specific gravity. The barometer at 30 inches is the scientific standard for atmospheric pressure, but slight variations are not taken into account in ordinary determinations; temperature, however, is important and authorities generally state the degree at which the specific gravity (especially of fluids) is taken.

The specific gravity of solids is taken with their temperature at 0°C. and the water in which they are weighed at 4°C., because at these temperatures they are at their greatest density. For scientific purposes the specific gravity of fluids is taken at 0°C. and compared with water at 4°C. for the same reason, but for general purposes the specific gravity of fluids is calculated at a temperature more conveniently ascertained.

The U. S. P. now generally designates 25°C. (77°F.) as the standard temperature, except for alcohol and spiritous liquors—whisky, brandy, gin, rum etc.—which conform to the government standard 15.6°C. (60°F.).

The Br. P. designates 15.5°C. or 60°F. as the standard temperature for specific gravity, but their measuring vessels are graduated at 62°F. (16.7°C.).

Most of the other European authorities designate 15°C. (59°F.) as the standard temperature for calculating specific gravity, weight or density.

The specific gravity of solids is obtained by first weighing the solid at 0°C. in air and then in water at 4°C., the difference of weight of the solid shows the weight of water displaced and the weight of the solid in air divided by its loss of weight in water, (corresponding to the mass of water displaced), shows how much heavier the solid is than water. For very exact scientific calculations the weighing is conducted in vacuo.

The specific gravity of known solids has been so well determined and recorded that it is seldom necessary to test them except in laboratories where special chemical work is done.

The specific gravity of liquids is most accurately obtained by weighing them in a specific gravity bottle in which the liquid occupies the same space as a known volume of distilled water at a given temperature. The temperature of the liquid must be the same as the water with which the specific gravity bottle was graduated and its weight as compared with that of water as 1.00 or 1.000 will show the specific gravity of the liquid.

More rapid, but less accurate determinations may be made with hollow glass beads or specific gravity bulbs, weighted to exactly float in liquids of definite specific gravity.

Hydrometers of various kinds for testing the specific gravity of various liquids, are in general use and are sufficiently accurate for commercial purposes, but are not depended upon for exact scientific determinations. <Hydrometry following.

The specific gravity of gases is determined by comparing the weight of a given volume of gas at the same atmospheric pressure (760 mm.) with the weight of the same volume of air or hydrogen under the same conditions of temperature (0°C.), and pressure (760 mm.).

The specific weight of gases is well known and recorded and it is seldom necessary to test them in ordinary affairs of pharmacy. The conditions of temperature, pressure and moisture are so important in determining the specific gravity of gases that it is seldom attempted, except in specially equipped laboratories.

Hydrometry.

Hydrometry is the art or practice of determining the specific weight or gravity of substances by means of graduated instruments which float in a liquid and indicate, either by weights or marks on a stem, the specific gravity or density of the substance being tested.

The first authentic record of an instrument for this purpose was the description in the Philosophical Transactions for June, 1675, of a "New Essay Instrument" invented by Robert Boyle. This instrument was devised for the purpose of detecting counterfeit coin, especially guineas and half-guineas; the coins were attached by a clamp at the bottom of the instrument and a mark on the stem, to which the instrument sank in water when a coin was attached, showed by its specific weight, whether it was genuine or counterfeit. Early in the Eighteenth Century Fahrenheit constructed a hydrometer on the Boyle idea, but arranged it with a small scale-pan at the top of the stem, upon which weights might be placed, thus adapting it to determine the specific gravity of many substances. Later Nicholson's hydrometer, which combined the character of the Fahrenheit and Boyle instruments came into use. Nichols' hydrometer (which is the same as the original Nicholson's) is still in use and may be had, either in brass or glass, of dealers in chemical ware in this country. These hydrometers are designated as **hydrometers of constant immersion but variable weight**, because the stem of the instrument always sinks to the same mark, when weights are added upon the pan equal to the specific weight of the substance being tested. There are also **hydrometers of variable immersion but constant weight**, which show the specific weight of a solid by the depth to which the graduated stem sinks in distilled water. These instruments are also arranged with a scale-pan for weights at the top which supplement the scale. Failyer's hydrometer of this type is a combination of the Nichols' and Baumé forms, and is very convenient for quickly determining the specific weight of minerals. Hydrometers of this class can be had at a very moderate cost, and are very convenient for determining the specific gravity of insoluble solids. Some of them may also be used for liquids, but hydrometers of constant weight and variable immersion, showing on a graduated scale the depth to which the instrument sinks in the liquid being tested, are much more convenient for this purpose.

Baumé's hydrometer, invented by Antoine Baumé about 1762, was the first instrument of this kind, and, although it is unscientific and has an arbitrary scale of degrees, of uncertain meaning, is still more generally used than any other hydrometer. It is calculated for temperature at 60°F.

There are two kinds of Baumé hydrometers: One for liquids lighter than water, in which the degrees begin with 10° at the bottom of the scale, corresponding with water as 1000, and increase upwards while the specific gravity markings on the scale decrease upwards on the scale; and the other for liquids heavier than water, in which the scale starts with 0 degrees at the top, corresponding with water at 1.000, and both the degrees and the specific gravity markings increase downwards on the scale.

A great variety of Baumé hydrometers are furnished by the manufacturers for various uses. Hydrometers for liquids lighter than water are furnished for general uses, and for ammonia water, spirits, ether, naphtha, and other liquids having specific gravity less than 1.000; for liquids heavier than water, besides the regular standard hydrometers are acidometers, lactometers,

saccharometers, salimeters, urinometers etc., in great variety, instruments calculated for many purposes being obtainable.

Most liquid chemicals are tested by the Baumé hydrometers, but for very exact determinations the pycnometer, or the hydrostatic balance are employed.

Twaddell's hydrometer. This is commonly used in Great Britain for testing liquids heavier than water. It is graduated in such a manner that the reading of the number of degrees multiplied by five and added to 1,000 indicates the specific gravity of the liquid compared with water at 1,000.

Gay-Lussac's Alcoholometer. In this instrument the scale is divided into 100 parts, each part corresponding to 1 percent., by volume, of alcohol at 15°C., the highest division indicating pure alcohol (density 0.7947), and the lowest corresponding to pure water, 1,000. The Gay-Lussac alcoholometer and tables are quite generally used throughout Continental Europe.

Tralles' Alcoholometer. This differs from the Gay-Lussac instrument by being calculated at 60°F. instead of 59°; the density of pure alcohol is also calculated at 0.7939. These differences make a corresponding difference in the tables. Tralles' is used chiefly in Great Britain.

A great many other kinds of hydrometers are made by various manufacturers for various purposes. Among modern hydrometers recognized as reliable and of reasonable price are the Brix instruments; they are very accurately graduated for fractions of a degree and are therefore closer reading than the ordinary hydrometers.

Many hydrometers are furnished with thermometers enclosed in the glass, indicating the temperature of the liquid and showing the correction necessary for temperature above or below the specified degree. While this is not always accurate it is very convenient for ordinary testing.

Pycnometers or Specific Gravity Bottles. These bottles are so made that they hold when completely full of distilled water at a specified temperature, exactly 25 or 50 or 100 Gm. There are also pycnometers that hold 500 Cc. Some pycnometers are fitted with a thermometer by which the temperature of the liquid being tested is shown, and indicating corrections to be made for temperature. Pycnometers do not differ essentially from regular specific gravity bottles with perforated corks. The pycnometer or the specific gravity bottles are much more reliable than hydrometers.

Densimeters are instruments for determining the specific gravity of a small quantity of liquid. They are constructed somewhat like a Baumé hydrometer, but at the top of the stem is a small tubular cup into which the liquid to be tested is placed, a mark on the side of the tubular cup showing the volume of a cubic centimeter. The graduated stem below the cup shows the depth to which it sinks in water and the sp. gr. of the liquid being tested is calculated from its weight as compared with water.

Hydrostatic Balance. These are specially constructed balance scales for determining the specific weight or gravity of liquids, or solids. It is simply a specific gravity weighing scale showing the weight of a substance in water, which, when compared with its weight in air, indicates its specific weight or specific gravity. There are several of these balances made, but probably the best is the combination known as the Mohr-Westphal balance. With this balance the specific weight of any substance, either liquid or solid, may be readily determined.

Calculating the Specific Gravity of Solids.

The specific gravity of elementary metals and their well known alloys has been so well determined by chemists that it is now seldom required to weigh them for that purpose. Therefore mere mention of the methods employed for determining the specific gravity of solids will be given here.

Solids heavier than water are first weighed in the ordinary way, and then, by suspending them to one side of a balance by a fine thread, are immersed in water and weighed. The ordinary weight divided by the loss of weight in water gives the specific gravity of the solids.

Solids lighter than water are first weighed, and then attached or tied to some heavy metal of known weight and specific gravity; the two substances are then weighed and immersed in water together and the loss of weight of the lighter substance, determined by deducting the loss of weight of the heavy metal, previously found, from the total loss. The original weight of the lighter substance is then divided by the loss of weight in water, as shown by the former operation and the result is the specific gravity of the substance.

Solids soluble in water are first weighed suspended in some liquid in which they are insoluble, as naphtha, alcohol or oil. The weight in the liquid subtracted from the ordinary weight gives the loss of weight; the ordinary weight is divided by the loss of weight thus obtained, and the quotient multiplied by the specific gravity of the liquid in which the solids are weighed—this gives the specific gravity of the solid.

Powdered substances are first weighed and their weight added to that of the specific gravity bottle and 1000 grains of water, as described for calculating the specific gravity of liquids. The powder is then put into a bottle and enough distilled water at 15.6°C. (60°F.) added to fill it to the water level marks on the bottle. It is then weighed and its weight subtracted from the gross weight previously obtained; this shows the loss of weight in water. The ordinary weight of the powder is now divided

by the loss of weight as shown by subtraction; the quotient is the specific gravity of the powder.

Calculating the Specific Gravity of Liquids.

Specific gravity bottles, very light, with perforated glass stoppers, and designed to hold 100, 500 or 1000 grains, or 50, 250 or 500 grammes of distilled water, may be had of dealers in chemical ware.

The bottle, (empty), is first accurately weighed and the weight noted or marked upon it; or the bottle may be counter-balanced on a scale. The bottle is then completely filled so that the liquid at the temperature at which the sp. gr. is to be taken will completely fill the perforated stopper. The bottle and its contents is then accurately weighed and the weight of the empty bottle, previously obtained, deducted from the weight of the filled bottle. The remainder shows the specific gravity of the liquid. If the bottle is for 1000 grains and the remainder shows the weight of the liquid being tested 860 grains, the specific gravity would be 0.860; if the remainder shows the weight of the liquid to be 1114 grains, then the sp. gr. would be 1.114.

For small quantities a small bottle holding 100 grains is most desirable. The procedure is the same as with the 1000 grain bottle, but the sp. gr. is calculated in hundredths instead of thousandths.

Specific gravity bottles may be made for ordinary purposes as follows:

First.—Take a thin bottle, with a long neck, that will hold three or four ounces—a long-necked bottle that 1000 grains of water will fill into the neck is the most accurate—paste strips of paper on two opposite sides and weigh the bottle accurately, marking the weight in grains—metric weight may be used instead of grains—on one of the strips. Then weigh in the bottle just 1000 grains of distilled water at a temperature of 15.6°C. (60°F.), and mark the strips of paper on each side of the bottle just at the surface of the water, when the bottle is standing perfectly level. Mark 1000, the weight of the water,

under the weight of the bottle and add them together for the gross weight, then empty the bottle and it is ready for use.

Second.—Having brought the liquid to be calculated to the desired temperature, 15.6°C. (60°F.), pour it into the bottle previously used, until its surface comes just level with the water level marks on the strips of paper; then weigh it accurately, noting the gross weight in grains.

Third.—Find the difference between the gross weight of the first and second operations. If the weight of the first operation is greater than the second, subtract the difference from 1000 and point off three places as decimals. If the weight of the first operation is less than the second, add the difference to 1000 and point off three places as decimals.

Example No. 1.—The gross weight of a bottle with 1000 grains of water is 1723 grains, the gross weight of the same volume of a liquid in the same bottle is 1671 grains. What is the specific gravity of the liquid?
 $1723-1671=52$ difference.
 $1000-52=0.948$ sp. gr. of liquid.

Example No. 2.—The gross weight of a bottle with 1000 grains of water is 1723 grains, the gross weight of another liquid in the same bottle is 2184 grains. What is its sp. gr.?
 $2184-1723=461$ difference.
 $1000+461=1.461$ sp. gr. of liquid.

This method of determining the specific gravity of liquids is quite accurate, and very convenient when the bottle is once prepared. It is also adapted to small quantities of liquids as it can be calculated for 100 grains or 10 grains in the same general manner. It can be used also for light or heavy liquids.

Baumé Hydrometer.

As this is the hydrometer chiefly used in this country, and is the instrument upon which most specific gravity calculations are based, the following description is given:

Baumé, in 1768, invented an instrument which he called an *Areometer*, now known as Baumé's Hydrometer. This was the first instrument to show by a graduated scale and the depth

to which it sank in the liquid, the specific gravity of the liquid. These hydrometers were made for liquids either lighter or heavier than water and were known as "hydrometers of constant weight but variable immersion." This form of hydrometer presented great advantages over the forms that had previously been used for determining the specific gravity of liquids, and the principle upon which they were constructed has been adopted generally by all who have followed Baumé, although some modifications of the scale have been introduced by other inventors.

The Baumé hydrometer for liquids lighter than water is made to sink to 0 at the bottom of the stem in a 10 percent. solution of salt in pure water at 12.5°C. and to 10° in pure water, the stem is then graduated by marking it in lines of $\frac{1}{10}$ of the distance between 0° and 10° , and then extending the scale above the 10° marking in the same manner to the top of the stem.

For liquids heavier than water the instrument is weighted to sink in water at 12.5°C. to near the top of the stem and the line of level is marked 0, it is then floated in a 15 percent. solution of salt in water at the same temperature and the point to which it sinks in this solution is marked 15° and the space between into 15 divisions each representing one degree. The scale is then extended downward marking in the same manner to the bottom of the scale. These marks represent degrees Baumé.

Baumé Degrees and Specific Gravity.

For Liquids Lighter than Water.

To show the sp. gr. indicated by degrees Baumé:

Add the number of Baumé degrees to 130 and divide 140 by the sum.

Example.—What is the specific gravity of a liquid of 20° B.?

$$130+20=150. \quad 140 \div 150=0.933 \text{ sp. gr.}$$

To convert specific gravity into corresponding B. degrees. Divide 140 by the specific weight and subtract 130 from the quotient.

Example.—What degree B. is indicated by sp. gr. 0.933?

$$140 \div 0.933=150. \quad 150-130=20^{\circ} \text{ B.}$$

For Liquids Heavier than Water.

To show the sp. gr. indicated by degrees Baumé:

Subtract the number of Baumé degrees indicated from 145 and divide 145 by the remainder.

Example.—What is the specific gravity of a liquid of 30° B.?

$$145 - 30 = 115. \quad 145 \div 115 = 1.261 \text{ sp. gr.}$$

To convert sp. gr. into corresponding B. degrees: Divide 145 by the specific weight and subtract 145 from the quotient.

Example.—What degree B. is indicated by sp. gr. 1.261?

$$145 \div 1.261 = 115. \quad 145 - 115 = 30^\circ \text{ B.}$$

Besides these hydrometers, which are more generally known, are many others that have been introduced and passed out of use, and also a considerable number of more recently introduced instruments of greater scientific construction and accuracy, as the Brix hydrometers, and for special uses, as the Balling's for beer and wort; Oechsels for must and wine, and a variety for other purposes as for ammonia, bark liquor, benzine, gasoline, chlorine, cider, coal oil, ether, glue, glycerin, lime, milk, oils, salt solutions, silver solutions, cream, sugar, syrup, sweet-water, urine, vinegar, etc., each bearing a name indicating their special use, as lactometer, saccharometer, salinometer etc.

Although the Baumé hydrometers are in very general use, especially for commercial purposes, the scales are arbitrary, uncertain and unscientific and should be discarded for more scientific and accurate instruments of which there are many now available.

Gay-Lussac devised a Centesimal Alcoholmeter, with the scale divided into 100 parts indicating in measures of 1 percent., the volume of alcohol at 15°C. contained in spirits. The highest number indicated absolute alcohol, sp. gr. .7947, the lowest, pure water, 1000. Directions for the use of this hydrometer, with tables indicating the percentage of alcohol were published in 1824 and came into extensive use in continental Europe.

Tralles' hydrometer differs from Gay-Lussac's in being calculated at the temperature of 60°F. instead of 15°C.

Beck's hydrometer assumes the zero of the scale as 1.000 and the division 30 as density 0.850, with divisions in both directions corresponding to these. This scale is now seldom used.

Sykes' hydrometer which was adopted by Great Britain in 1811 was constructed after the idea of Dr. Boriés or Montpellier and was calculated upon experiments made by mixing alcohol and water in differing proportions. The Sykes' scale was calculated both for 60°F. and 62°F. and has been extensively used in England in determining spirit proof.

Twaddell's hydrometer, for liquids heavier than water is so arranged that the reading on the scale multiplied by 5 and added to 1000 indicates the specific gravity of the liquid compared with water at 1000.

Twaddell's hydrometers are quite small compared with others, the scale occupying only about 75 —millimeters in length and the range being only about 30 degrees for each instrument. It requires six instruments to make a complete set.

Most hydrometers designed for use in the United States and Great Britain are calculated to be used at a temperature of 60°F., but many of them have a thermometer enclosed, with a scale showing corrections for variation of temperature. The U. S. P. generally directs specific gravity to be taken at 25°C. (77°F.), but in the case of spiritous liquors conforms with the government standard of 60°F.

Most European hydrometers are designed to be used at a temperature of 15°C. and most European authorities (except Great Britain) designate 15°C. as the temperature at which specific gravity, weight or density of liquids should be taken.

It should be noted here that the specific gravity of solids and gases are determined in all countries at 0°C. and, with gases, at a pressure of 76cm. which is equivalent to the barometer at 30 inches.

Hydrometers are graduated for different purposes according to the range of degrees required; if only a short range is necessary the spaces may be further between for a degree, if a wider range is required the spaces

must, necessarily, be shorter. For spirits and liquids lighter than water, hydrometers range from 0.700 to 1.000, for liquids heavier than water from 1.000 to 1.400 and from 1.400 to 2.000 may be required; for special work a much shorter range will suffice; as for milk, benzine and gasoline, coal oil, oils, glycerin, urine etc., in which the range is only a few degrees.

For general laboratory work hydrometers that indicate differences of 0.005 may be used for all purposes, while those that indicate 0.05 are quite satisfactory for most uses.

The jar in which the hydrometer floats should be of sufficient diameter so that the instrument will not adhere to the sides, for there is always an electrical attraction tending to draw the hydrometer against the side of the glass jar in which it floats.

The reading of a hydrometer is of much importance as there is usually

a meniscus and sometimes foam or bubbles on the surface of the liquid. The reading should be taken on the level of the liquid and at the mark which corresponds with the middle of the meniscus. A drop of ether added to the surface of the liquid will dissipate the foam or bubbles, if any be present.

The Densimeter, invented by Rouseau, is an instrument for determining the specific gravity of small quantities of a liquid. It is arranged with a small tube on the top into which 1Cc. of the liquid to be tested is placed and the depth to which it sinks indicates the sp. gr.

The Picnometer is a form of specific gravity bottle for accurately determining the specific gravity of liquids. Several kinds may be had of manufacturers, but they are all made on the same principle as those previously described under specific gravity bottles.

HEAT MEASURES

Heat is a phenomenon pervading the entire universe and manifested in all forms of matter. Like light and electricity it has neither weight nor form, and is not, in any way, material; but by its action upon substances, it is made perceptible to the senses, is capable of being measured, and is recognized as a factor in all physical and chemical processes. Physicists call heat "a form of energy" or "a mode of motion."

Temperature is the expression of heat in any substance or body, either as manifest to the senses, or to instruments constructed to record the hotness of substances.

THERMOMETRY.

Thermometry is the process or act of determining by means of graduated instruments, the temperature or hotness of substances. This is shown by means of a graduated scale on, or connected with a small tube, in which gas or a liquid is enclosed, which expands or contracts, according to the temperature, showing by marks on the scale, the degrees of heat of the body or substance.

Early History of Thermometry.

Galileo's Thermometer was the first of which there is any authentic record. All the early thermometers were air thermometers. This was said to have been invented by him before 1597. His first instrument consisted of a long glass tube connected with a bulb at its upper end and dipping at its lower end into a vessel of colored water. The variations of temperature caused a rise or fall of the liquid in the tube which, being studied and recorded, made the data for constructing a scale. This led to the invention of the alcohol thermometer by Galileo about 1612. It was constructed with a bulb at the bottom and a connecting tube in the same manner as the present forms of thermometers. The scale was arbitrary and was reliable only to the vaporizing point of alcohol. Several other scientists invented thermometers about the same time but it is, doubtless, to Galileo that the credit for the invention of this useful instrument should be accorded.

The Fahrenheit Scale.

Fahrenheit in 1714 constructed a thermometer, taking as one of the fixed points the temperature of the human body, and a mixture of sal ammoniac or common salt with ice as the low point. In 1721 he first used mercury in a thermometer, according to the suggestion of Halley in 1693; but it was not until after Fahrenheit's death that the freezing and boiling points of water were universally accepted as fixed points on the thermometric scale. It is probable that the zero of the Fahrenheit scale was chosen because it was the lowest point then produced by a mixture of sal ammoniac or salt and ice, and no other means of producing a lower artificial temperature was then known. When the freezing (32°) and boiling (212°) points of water were determined, the scale between then was marked off into 180 divisions or degrees, leaving the freezing point of water 32° and the 0° or zero, 32° below freezing, as the lowest artificial temperature known. The freezing point of water on the Fahrenheit scale being 32° is very inconvenient for comparative calculations, but it was thus established and must thus remain.

The Réaumur Scale.

Réaumur in 1730 constructed the scale which bears his name. The freezing point of water was 0° and its boiling point 80° . His thermometer was first made with alcohol but afterwards mercury was adopted.

The Centigrade Scale.

Celsius in 1742 constructed the centesimal scale, marking the boiling point of water 0° and the freezing point 100° .

Linnæus, not long afterwards, reversed the order of the scale, making the freezing point of water 0° and its boiling point 100° . This scale soon came to be known as the Centigrade Scale, and was adopted by that name as a standard. This is the most convenient scale in use and is destined in time to supersede the other standards.

Several other scales were invented and some of them used for some time, but the above mentioned are the only ones that have survived.

Absolute Temperature Scale.

This is a scale of comparison used in physical thermometry, but not an instrument of measurement, the degrees of the Centigrade or Fahrenheit thermometer being converted to its range.

This scale assumes the temperature at which a perfect gas will exert no pressure as **zero**, absolute temperature 0° . This corresponds with -273°C . (-459°F .). The absolute scale increases by degrees upwards to 0°C . (32°F .), the freezing point of water, which is 273° Absolute, increasing from this point to 100°C . (212°F .), the boiling point of water, which is 373° Absolute, and as much higher in the same relation, as it may be desired to calculate, the degree of the absolute scale being the same in value as the Centigrade degree, but the marking being from 0° Absolute (-273°C .) up, while the Centigrade scale reads down from 0°C . with minus ($-$) before the degrees to 0° Absolute (-273°C .).

Thermometers.

A great variety of thermometers are made for various purposes. To describe them all would require a volume. The ordinary Centigrade and Fahrenheit thermometers are sufficient for ordinary requirements of pharmacy.

Chemical Thermometers of many kinds are supplied by manufacturers. For temperatures below -40 at which mercury freezes, alcohol may be used for a considerable range, but for very low temperatures, pentane or toluene are used as the expansive liquid. Pentane thermometers registering -200°C . may be had. For high temperatures up to 360°C . simple mercury thermometers may be used, but above that, up to 550°C . special mercury thermometers filled with carbon dioxide under 20 atmospheres pressure, or nitrogen, and so arranged as to prevent the boiling of mercury, are supplied. For temperatures higher than this **pyrometers** of various kinds are generally employed. Electrical pyrometers are made to record as high as 7000°C . temperature.

For exact determination of temperatures beyond the range of ordinary thermometers, the gas thermometer is employed. Gases expand equally under the same conditions of heat and pressure, therefore, hydrogen, common air, nitrogen, oxygen, carbonic acid or other perfect gas may be used as the expansive medium.

Clinical Thermometers. Thermometers designed to register the temperature of the human body, by inserting them in the mouth of the patient, are used by physicians and nurses. These thermometers are of short range (90° to 110°F .), and are graduated in tenths of a degree.

The Heat Unit.

A unit of heat is the amount of heat necessary to raise the temperature of a certain quantity of water one degree.

Calorie. The heat unit called the "**calorie**" has been generally adopted for scientific calculations. A calorie varies slightly at different temperatures, but

its value, as now generally accepted, is the quantity of heat required to raise the temperature of 1 gram of water from 17° to 18°C . This unit is called the "calorie at 17.5° " and is abbreviated **cal**. The "mean calorie" is one one-hundredth part of the heat required to raise the temperature of 1 gram of water from 0° to 100°C . This differs from the calorie at 17.5° by less than 0.1 percent.

Calorimetry is the process or act of determining the heat value of a substance in heat units or calories.

Calorimeters are instruments used for the determination of the heat value of combustible substances, fuels etc., in heat units or calories. A variety of these instruments, (most all expensive) are furnished by manufacturers for various purposes.

Heat Measures.

The only scales now used to any extent for registering temperature are those of Fahrenheit, Réaumur and Celsius, the latter being known in most countries as the Centigrade scale. The Fahrenheit is chiefly used in America and Great Britain, the Réaumur in Germany, and the Centigrade in France and other countries of Europe, and in scientific calculations in nearly all countries.

Thermometric scales are calculated from the expansion of mercury or alcohol in a small vacuum tube, having usually a bulb or reservoir at the bottom.

The Centigrade scale assumes the temperature at which water freezes as 0° , and the temperature at which it boils with the barometer at 30 inches as 100° , making 100° between the freezing and boiling points of water.

The Fahrenheit scale assumes the temperature at which water freezes as 32° , and the temperature at which it boils with the barometer at 30 inches as 212° , making 180° between the freezing and the boiling points of water.

The Réaumur scale, which is little used in this country, except by brewers and maltsters, assumes the temperature at which water freezes as 0° , and the temperature at which it boils with the barometer at 30 inches as 80° , making 80° between the freezing and boiling points of water.

Many other thermometric scales have been introduced and have had a more or less limited use for a time, but are now obsolete, except for occasional mention in the older works.

The following table shows a comparison of the scales from the freezing to the boiling points of water:

Comparison of Thermometric Scales.

	C.°	F.°	R.°
Water	100	212	80 boils
	95	203	76
	90	194	72
	85	185	68
	80	176	64
	75	167	60
	70	158	56
	65	149	52
	60	140	48
	55	131	44
	50	122	40
	45	113	36
	40	104	32
	35	95	28
	30	86	24
	25	77	20
	20	68	16
	15	59	12
	10	50	8
	5	41	4
Water	0	32	0 freezes

It will be seen by the foregoing scales that a Centigrade degree is $1\frac{1}{4}$ Fahrenheit or $\frac{4}{5}$ Réaumur degrees; and that a Fahrenheit degree is five-ninths degree Centigrade, or four-ninths Réaumur degrees; and that a Réaumur degree is $1\frac{1}{4}$ Centigrade or $2\frac{1}{4}$ Fahrenheit degrees.

Rules for Converting One Scale into Another.

The following rules will be found convenient for reducing or converting one scale to another.

To reduce Centigrade to Fahrenheit.

Rule.—Multiply the given degrees Centigrade by $1\frac{1}{4}$ and add 32 to the product.

Example.—What degree Fahrenheit is 25° Centigrade? $25 \times \frac{1}{4} + 32 = 77^{\circ}$ Fahrenheit.

To reduce Réaumur to Fahrenheit.

Rule.—Multiply the given degrees Réaumur by $2\frac{1}{4}$ and add 32 to the product.

To reduce Fahrenheit to Centigrade.

Rule.—Subtract 32 from the given degrees Fahrenheit and divide the remainder by $1\frac{1}{2}$.

Example.—What degree Centigrade is 176° Fahrenheit? $176 - 32 \div \frac{9}{5} = 80^{\circ}$ Centigrade.

To reduce Fahrenheit to Réaumur.

Rule.—Subtract 32 from the given degrees Fahrenheit and divide the remainder by $2\frac{1}{4}$.

To reduce Réaumur to Centigrade.

Rule.—Multiply the given degree Réaumur by $1\frac{1}{4}$.

To reduce Centigrade to Réaumur.

Rule.—Multiply the given degree Centigrade by $\frac{4}{5}$.

In reducing Fahrenheit to other scales or vice versa, 32 is added or subtracted because the Fahrenheit scale is marked 32 where the other scales are marked 0, viz., at the freezing point of water. Bear in mind that in computing the degrees below 0°C. or R. , the product of the multiplication is a minus quantity, and that adding plus 32 to the minus quantity is the same as taking the difference between them. Recent American works on pharmacy and chemistry give both the Centigrade and the Fahrenheit degrees, so there is no reason that druggists should not be as familiar with one as the other.

Summary.

$$1^{\circ}\text{C.} = 1.80^{\circ}\text{F.} = 0.80^{\circ}\text{R.}$$

$$1^{\circ}\text{F.} = 0.55^{\circ}\text{C.} = 0.44^{\circ}\text{R.}$$

$$1^{\circ}\text{R.} = 2.25^{\circ}\text{F.} = 1.25^{\circ}\text{C.}$$

$$\text{C. degrees} \times 9 \div 5 + 32 = \text{F. degrees.}$$

$$\text{C. degrees} \times 4 \div 5 = \text{R. degrees.}$$

$$\text{F. degrees} - 32 \times 5 \div 9 = \text{C. degrees.}$$

$$\text{F. degrees} - 32 \times 4 \div 9 = \text{R. degrees.}$$

$$\text{R. degrees} \times 9 \div 4 + 32 = \text{F. degrees.}$$

$$\text{R. degrees} \times 5 \div 4 = \text{C. degrees.}$$

At -40°C. (-40°F.), about the freezing point of mercury, the Centigrade and Fahrenheit scales have the same reading. From this point the C. scale reads with a minus sign up to -17.778° , which is equivalent to 0°F. From this point the C. scale reads with a minus sign up to 0, while

the Fahrenheit scale reads plus from 0 to 32° , which is equivalent to 0°C. Above this both scales are plus quantities; each 5 degrees of Centigrade counting as 9 degrees more +32 on the F. scale. 5°C. being 41°F. , 10°C. being 50°F. , and so on.

The U. S. P. has a table of Thermometric Equivalents ranging from -40°C. (-40°F.) to 335°C. (635°F.). This may be referred to when converting one scale into another.

Specific Heat or Heat Capacity.

When two different substances of equal weight are heated for an equal length of time in the same manner, and at the same temperature, it will be found that the substances differ in temperature; that is, that the same degree of heat, applied under the same conditions to both substances, does not give them the same temperature. The temperature shown is the specific heat or the heat capacity of the substance. The calorimeter is the apparatus in which substances should be heated for this purpose as an equal heat may be applied to two substances at the same time and in the same manner.

Water, having the greatest specific heat of any simple substance, is taken as the standard of comparison as 1,000. Every substance has its specific heat which varies with the temperature. The specific heat of solids increase as they approach the fusing point. The specific heat of liquids increase with the temperature much more rapidly than solids. The specific heat of gases, when compared with water, represent the quantity of heat necessary to raise a given weight of gas through one degree, as compared with the quantity of heat necessary to raise the same weight of water one degree. Air is sometimes taken as the standard of comparison for the specific heat of gases.

Latent Heat.

When a solid passes by fusion into a liquid state the temperature remains constant until the fusion is completed. The heat which is absorbed when a solid is converted into a liquid is called **latent heat** or latent heat of fusion. Latent heat is more fully described in the Dictionary part of this work.

WORKING PROCESSES

OF CHEMISTRY AND PHARMACY.

The processes which follow under this heading are such as druggists or manufacturers may employ in their business; but in large manufacturing establishments many other processes which require special machinery adapted to their particular needs are employed. It is not the purpose of this work to go into elaborate details of large manufacture, but to give such simple directions as are adapted to the requirements and facilities of druggists and small manufacturers of pharmaceutical products, and such general information as may be of value to those engaged in pharmacy. For further information on special manufacture our readers are referred to special works which can be obtained from publishers upon any particular subject in which they may be interested.

ABSORPTION.

In a general sense the principle, act or process by which a substance takes up or absorbs another substance is called *absorption*. Thus certain substances may absorb heat, light or electricity; liquids or solids may absorb gases; solids may absorb liquids, liquids solids (solution); magnesia or chalk may absorb acids; and in physiology certain vessels, tissues or glands may absorb gases and fluids—the act in all these cases is *absorption* and the substance which holds or contains the absorbed substance or the quantity absorbed is called the *absorbent*.

In nature absorption is universal and is an essential function of vegetable and animal life; in chemistry it is necessary in the production of many chemical substances, and, in pharmacy, it frequently occurs, in connection with other processes, in making official and unofficial preparations. Ammonia water, chlorine water, carbonic acid water, formaldehyde solution and many of the liquid acids are examples of absorption of gas by water; most solutions of chemical salts are the result of absorption; the absorption of water

by quick lime; the conversion of iron into steel by absorption of carbon from charcoal or coke; the absorption of oxygen by platinum sponge and manganese; the absorption of water by earthy soils, and gas and petroleum by sandstone, as found in drilling for natural gas and petroleum; all illustrate different form of absorption.

While it is not, strictly, a pharmaceutical process, it occurs in many of the processes employed in pharmacy and will be referred to frequently in this work.

AÉRATION. The absorption of air or carbonic acid gas under pressure by water is called aération. This term is applied, properly, only to the absorption of air, but is more frequently used in reference to the “charging” of water, mineral waters, etc., with gas as used for soda fountains, siphons, etc. Aërated waters (as commonly known) are waters charged with carbon dioxide.

AMALGAMATION.

In a general sense amalgamation is the act or process of bringing together, in unison, substances, principles or things.

In metallurgy it is the process of forming an amalgam by union of mercury with other metals, (as gold, silver, copper, tin etc.), or their extraction by amalgamation from ores or admixtures with metals which do not amalgamate. In the arts, coating glass with mercury and tinfoil, or gold and silver foil is familiar. In mining the process of extracting gold and silver by amalgamation is extensively practiced. In dentistry an amalgam of silver with mercury is made for filling teeth, silver in fine filings being mixed with mercury and excess of mercury removed by squeezing it through chamois leather. The nearest approach to the isolation of ammonium is by amalgamation with mercury. In chemistry the term amalgamation is generally used in connection with mercury but rarely it is used to express the union or combination of any substances which may combine to form a new body.

CLARIFICATION.

Clarification is an operation by which substances are cleared or clarified or freed from insoluble or extraneous matter.

In pharmacy a number of processes are employed for clarification. Pressing, straining, filtering, precipitating, decanting, siphoning, percolating, distilling, crystallizing, subliming and refrigerating are all used as methods of clarifying various substances; heat and cold are employed as adjuncts in some of the processes used for clarification.

A natural process of clarification of liquids is by *subsidence* of insoluble matters after standing. The clarified liquid may then be drawn off, decanted or siphoned from the sediment which has collected at the bottom. Some liquids have a film or layer floating on the top which it is desirable to separate from the clear liquid underneath; this may be accomplished by means of a siphon in many cases, or by a separating funnel, having a glass stopper at the bottom which can be closed when the clear liquid has passed; or the lower orifice of a funnel may be closed with a cork, which may be loosened to allow the passage of the clear liquid and closed to prevent the supernatant layer from passing.

Some liquids are clarified by the addition of substances which cause a

precipitation of suspended or dissolved matter, as milk of lime is used in clarifying "hard" water; or milk, albumen or gelatin for clarifying wines, etc.

Pressure is used for clearing or clarifying many liquids containing coarse sediment or pulp, as fruit juices, etc., and oils are freed from stearin, paraffin and other solidifiable compounds by refrigeration and pressure. The most common method of clarifying liquids in pharmacy is by straining or filtering. Syrups are strained through muslin, cotton-flannel or felt strainers or bags, thin liquids are filtered through insoluble mediums, as sand, charcoal, magnesia, calcium phosphate, or through cotton-wool, filtering paper or filtering pulp.

Volatile liquids are freed from impurities by distillation; some chemicals by sublimation, others by crystallization, etc.

The methods used for clarification are, mostly, under other headings, as distillation, dialysis, crystallization, expression, filtration, precipitation, refrigeration, separation, etc.

COMBINATION.

Several processes are employed for combining drugs, among which the following may be mentioned:

AGITATION. The process of stirring or shaking which causes mixtures to be more thoroughly combined is called agitation. Gases are forced into water and the mixture agitated to aid the solution of the gas in the water; liquids are combined and rubbed or stirred together to form emulsions, soaps, etc.; crystals are shaken with a liquid to facilitate their solution; and in pharmacy many substances are directed to be "mixed with agitation" or "added with agitation" to ensure their thorough incorporation.

MIXING. The method of mingling, blending or incorporating various substances together is called mixing. Chemical combinations may or may not take place. Gases may be mixed together as in the atmosphere, without chemical combination; water may be mixed with vinegar, resulting only in diluting it; various powders may be mixed together as in a tooth powder, but no chemical combination occurs. Mixtures may be clear or may sep-

arate, but the mixtures of the pharmacopœias generally separate and require shaking before they are dispensed.

In mixing powdered substances in small quantities a mortar may be used, or the powders may be sifted several times through a sieve. In mixing large quantities mixing machines, constructed for the purpose required may be operated. For mixing liquid preparations as emulsions, etc., special apparatus may be had of manufacturers.

TRITURATION. The process of rubbing solids or powders with other solids, powders or liquids, in a mortar, for a considerable time, in order to reduce the substance to a state of very minute division, or to mix them intimately, is known as "trituration." This is usually done for small quantities in an unglazed porcelain or wedgewood mortar of rather shallow shape in order to present as much surface as possible to the action of the pestle; for large quantities special appliances may be obtained. This subject is further considered under "Triturations" and "Homeopathic Triturations."

COMMUNUTION.

Under this general heading may be classed all processes by which drugs are reduced to the dimensions suited to the purposes for which they are to be used in pharmacy.

Cutting, contusing, grinding, crushing, granulating, powdering, triturating, sifting and bolting comprise the processes employed. Green roots of good dimensions, fleshy roots and tubers and some fruits are cut or sliced before drying. Dry roots, barks and twigs are cut or crushed, making them more convenient to handle. Certain flowers, leaves, barks and herbs are cut or chopped to a small size that they may be more readily dispensed or mixed, as in *Species*. All kinds of vegetable drugs may be ground into various sizes for marketing, or granulated or powdered for percolating or for dispensing.

Fine powders are prepared by sifting, triturating or bolting. Various apparatus is used for these purposes; cutting knives or rotary cutting machines, crushing mills or iron mortars, mills for grinding, shallow mortars for triturating and sieves of various fineness of mesh for separating the coarse

from the fine powders.

Pharmaceutical text books direct the fineness of the powders to be used for percolation.

Fineness of Powder.

To properly obtain the soluble constituents of drugs by the process of percolation, they should be comminuted or divided that the menstruum may dissolve all soluble matter.

To this end, different drugs are directed to be reduced to different degrees of fineness as experience has shown to be best suited to their nature.

The United States Pharmacopœia has adopted the following standard for the fineness of powders:

A **VERY FINE** powder should pass through a sieve having 80 or more meshes to the linear inch. (20 to the Cm.).—Equals No. 80 powder.

A **FINE** powder should pass through a sieve having 60 meshes to the linear inch. (24 to the Cm.).—Equals No. 60 powder.

A **MODERATELY FINE** powder should pass through a sieve having 50 meshes to the linear inch. (20 to the Cm.).—Equals No. 50 powder.

A **MODERATELY COARSE** powder should pass through a sieve having 40 meshes to the linear inch. (16 to the Cm.).—Equals No. 40 powder.

A **COARSE** powder should pass through a sieve having 20 meshes to the linear inch. (8 to the Cm.).—Equals No. 20 powder.

It is desirable for the purpose of percolation that the powder used should be as uniform as possible. In reducing drugs to different fineness of powder by any process that druggists may command, it is obvious that, unless the powder is very fine, quite a proportion of it will be much finer than the coarsest powder that will pass through the sieve having the required number of meshes to the inch. If this portion is separated from the coarser powder by sifting, that which remains will not truly represent the entire substance of the drug from which it was prepared.

In preparing a powder, therefore, for percolation, the entire quantity of the drug which is taken should be reduced to a powder that will pass through a sieve having the required number of meshes; or, if this produces a powder too fine for successful percolation, a

coarser sieve should be used; for it is better to use a coarser powder than to remove any portion of the drug which would be represented by the finer powder.

For the reasons stated the powders directed in the formulas of the U. S. P., are, as a rule, too fine for successful percolation by the majority of druggists, and better results will be secured by using one grade coarser powder than is designated.

Drugs are usually reduced to the required degree of fineness for percolation by grinding in a drug mill, but when finer powders are required the old, time-honored mortar and pestle comes into play. But few druggists, however, attempt to make what is known in the market as "powdered drugs." They are usually bought of reliable houses who make a business of putting them up.

Drugs "ground for percolation" may also be bought in the market, but as they mostly come in bulk, unless they are guaranteed by a reliable house, they are liable to adulteration, or to be ground from old or worthless drugs, and it is much better for the druggist to grind them himself, as needed, from reliable crude drugs. There are, however, some reliable firms who make a business of furnishing drugs granulated or ground for percolation, which may be relied upon, and thus save the druggist much tedious labor. Many of the important drugs are now furnished by manufacturing houses, bearing the assay requirement of the U. S. P., and guaranteed under the Pure Food and Drugs Law.

CONCENTRATION.

Concentration, in pharmacy, is a means employed to increase the strength or density of a substance by reducing its volume.

Various processes are applied for this purpose: Alcohol, ether, acetic acid, and many other substances are concentrated (made stronger) by distillation; extracts, fluid extracts, syrups, solutions, etc., by evaporation. Many chemical salts are separated from their solutions by evaporation and crystallization; centrifugal machines are employed for concentrating some substances by causing separation of their constituents; refrigeration is

used to concentrate many substances, as paraffin and stearoptens from oil, extracts in solution, weak spirits, etc., from dilutents or objectionable matters with which they are combined. Concentration is not properly a principle or a process; but an act in which various processes may be employed for various purposes. (See Evaporation, Distillation, Crystallization, Refrigeration, Separation, etc.).

REDUCTION. In chemistry this term is used to denote the lowering of temperature from a higher to a lower degree, change of volume or quantity from a greater to a less, or change of character or condition by eliminating some of the constituents of a substance. In a strictly chemical sense it expresses the loss of some constituent as by dehydration, or the reduction of a metal from its ore or salt. Reduction to an oxide is the elimination from a compound salt of all but the metal and the oxygen of the compound.

CRYSTALS AND CRYSTALLIZATION.

CRYSTALS. The word crystal is derived from a Greek word meaning ice or frozen water and was first applied to that substance; afterwards to pure transparent stones (rock crystals) cut into seals, as they were supposed to be produced only in the lofty and extremely cold passes of the Alps; later the term came to be used to denote any crystalline substance of geometric form. The forms of crystals are greatly varied but in crystallography they are all classified under six systems.

I. The **REGULAR SYSTEM** embraces the cube, the regular octohedron, and the rhombic dodecahedron. This system is also known as the isomeric, monometric, cubic, or tessular system. It is characterized by having three axes or imaginary lines of equal length passing through a common point and at right angles to each other. Rock-salt, iron pyrites, galena or lead ore, gold, silver, platinum and copper are common examples of cube crystals having six faces.

The diamond, sal ammoniac, magnetic iron ore and fluor spar are examples of the octohedron form of the same system, having eight faces.

The garnet is an example of a secondary form of this system, the rhombic dodekahedron, having twelve faces.

II. The HEXAGONAL SYSTEM, also known as the rhombohedral, has four axes, instead of three as in all other systems. Three of the axes are of the same length and are in the same plane, and incline to each other at an angle of 60 degrees; these are called the secondary axes, while the fourth, or primary axis may be longer or shorter and is perpendicular to the other three. Quartz or rock-crystal, sodium nitrate, arsenic, antimony and ice are familiar examples.

III. The QUADRATIC SYSTEM, which is also known as the square prismatic, pyramidal, or tetragonal system has three axes at right angles to each other, the primary axis may be longer or shorter than the two ordinary axes which are always of equal length. Pyramids of this system have square faces. Potassium ferrocyanide, calomel, tin binoxide, zircon and apophyllite are examples of this system.

IV. The RHOMBIC SYSTEM, also known as the right prismatic, trimetric, right rhomboidal or rectangular prismatic system, has three axes all of unequal length, which intersect each other at right angles. Sulphur, potassium nitrate, potassium sulphate, barium sulphate and topaz are examples of this system.

V. The MONOCLINIC SYSTEM, commonly called the oblique prismatic, oblique rhomboidal or rectangular prismatic, also has three axes of unequal length, the prismatic axis being at right angle with one of the secondary but at oblique angle with the other, the two secondary axes being at right angles to each other. A great number of chemical salts are classed under this system of crystallization. Iron sulphate, borax, sodium sulphate, carbonate and phosphate are examples.

VI. The TRICLINIC SYSTEM, which is also called the double oblique prismatic system, has three axes, all of unequal length and forming oblique angles with each other. Bismuth nitrate, copper sulphate, manganese sulphate, potassium quadroxalate, etc., are examples of this system.

The known forms of crystals is often of great importance in chemical analysis, and is especially useful to phar-

macists in testing the purity of drugs which they purchase. Substances of the same chemical composition as a rule crystallize in the same form; but the density of solution and the temperature sometimes influence the proportion of water which unites with the molecule to form crystals, for example, sodium phosphate crystallizes from solution at about 30° C., with twelve molecules of water; but from a saturated solution at 40° C., with but seven molecules. Zinc Sulphate crystallizes at ordinary temperature with seven molecules of water; but if the temperature is above 30° C., with only five molecules.

As crystals separate only from saturated solutions and as a greater degree of heat requires a greater proportion of the salt for saturation, it follows that some crystals take up less water of crystallization at a higher than a lower temperature.

The power which some crystals (Iceland spar or quartz) have of refracting light is made use of in testing sugars and some other substances by means of the polariscope.

A number of processes are employed in producing crystals, as solution, evaporation, refrigeration, dialysis, fusion, sublimation, precipitation, etc., which see.

Crystallization.

Crystallization is a natural process by which chemical substances solidify into definite geometrical forms. It most readily occurs in concentrated solutions of chemical substances, but in some instances may occur in the solids themselves, as iron axes crystallize after long continued use.

It is produced by molecular force inherent in the substances themselves and may be induced by presenting conditions favorable to the action of this force; as the lowering of temperature or refrigeration, concentration by evaporation, electrical action, the suspension in a solution of some substance which induces chemical separation or union, or something to which crystals may attach themselves.

CRYSTALLIZATION BY LOWERING TEMPERATURE. In many substances it is only necessary to lower the temperature at which they remain fluid, to the point at which they congeal or solidify to produce crystalliza-

tion. Water remains fluid until the temperature reaches 0°C ., or 32°F ., when it congeals or crystallizes: Anise oil is fluid at 62°F ., but becomes crystalline at 50°F . Glacial acetic acid solidifies at 58°F . Spermaceti fuses (melts) at 112°F ., but crystallizes to a solid at a lower temperature.

CRYSTALLIZATION BY CONCENTRATION. Most chemical salts are soluble in some degree and when the solution in which they are contained is evaporated, deposit in crystals. Common salt dissolves at N. T. in 2.8 parts of water. If this solution is evaporated the salt crystallizes. Quinine sulphate and other salts are extracted all together from Peruvian bark. Upon evaporating the solution containing these salts, quinine is first crystallized out, the other salts remain-

GALLERY THREE
ing in the mother liquid because they are more soluble than the quinine. Upon further concentration cinchonidine, cinchonine and other salts are crystallized out in the order of their insolubility.

The various alkaloids and salts contained together in drugs may, therefore, be separated from each other by concentrating their solutions to different degrees of density.

CRYSTALLIZATION BY ADHESION. If strings are suspended in a barrel of new wine, cream of tartar crystals forms on them. Rock candy is crystallized by suspending string in sugar syrup. If a strip of zinc is suspended in a solution of lead acetate, to which a few drops of acetic acid has been added, leafy crystals form and attach themselves to the zinc. When electricity is passed through solutions of certain metals, crystals are deposited. Thus in many ways crystallization is induced and made useful in chemistry and pharmacy for separating salts from their solutions and from each other in their solutions and for purifying chemicals and obtaining the active ingredients of medicines in a concentrated form.

COLLECTION OF CRYSTALS. When liquids are evaporated for the purpose of collecting crystals the evaporation should at first be carried only so far that a pellicle will form upon the surface of the hot liquid. The solution is then set in a cool place and allowed to remain at rest for some time until

crystals form. The *mother liquor* or liquid residue is then to be carefully drained from the crystals into another dish and carefully evaporated until a pellicle again forms, and is set aside as before to crystallize, and the operation may again be repeated if desirable to secure all the crystallizable salts from their solution. But three crops of satisfactory crystals can usually be obtained from a solution. The crystals may be drained from the same vessel in which they are crystallized, or by spreading them upon blotting paper or porous tile or glass; or in the case of small quantities of a salt the moisture remaining may be allowed to evaporate spontaneously until the crystals are thoroughly dry. When the crystals are collected from the different crystallizations and thoroughly dried they may be mixed and preserved in bottles.

SIZE OF CRYSTALS. Crystals vary greatly in size when prepared from the same solution; if larger crystals are required the solution should not be too greatly concentrated so that the crystals will form more slowly and perfectly; if small crystals are desired the solution should be strong and quickly cooled and may be agitated during the cooling which naturally lessens the size of the crystals. If the evaporation of the solution is continued to dryness, with constant stirring, *granulation* occurs. Small particles of crystallized salt of the same kind as is being crystallized, if added to the cooling solution, will greatly facilitate the forming of other crystals. The vessel in which the solution is allowed to crystallize should be broad and shallow, and preferably of glass or porcelain. An unglazed or rough surface is better than a smooth one for crystallizing.

For freeing crystals from mother liquor which is heavy or syrupy, a centrifugal machine called a *Centrifugator* is very useful, this apparatus is also very useful in drying salts which effloresce when exposed to the air.

WATER OF CRYSTALLIZATION. When crystallization occurs a certain proportion of water unites in the molecules with the basic substances. This is known as water of crystallization, and is an integral part of the crystalline substance.

EFFLORESCENCE. Upon exposure to the air the water of crystallization contained in some chemical salts

partially evaporates, causing the salts to effloresce or become dull in appearance and lose their luster. By heating crystals to excess the water of crystallization of salts is driven off and they are called dried or exsiccated.

DELIQUESCENT is the softening of crystalline or granular or amorphous salts by absorption of moisture from the atmosphere. Crystals which neither effloresce or deliquesce are called "permanent."

AMORPHOUS salts are those which do not assume crystalline form but naturally occur in masses or in powder.

DIALYSIS.

The process by which certain substances are separated from other substances with which they are combined in solution, by means of *osmosis*, or the diffusion of liquids through a thin membrane, is called Dialysis.

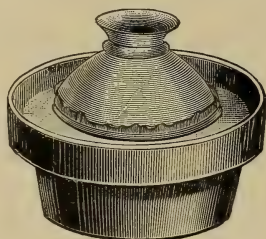
The physical principle involved in this operation, is that of diffusibility of gases and liquids, called *endosmosis* and *exosmosis*.

Many of the most important physiological operations in plant and animal life are dependent upon dialysis. The circulation of the sap in plants is an example of osmosis; the oxygen of the atmosphere regenerates the blood in the lungs and carbon dioxide is discharged from it by transfusion through the thin septa of the air cells which do not permit the blood (it being colloid) to pass; the separation of water and soluble salts from the blood by the kidneys which do not allow its colloid constituents to pass is another instance of natural dialysis.

HISTORY. Dialysis as a process of chemistry, was first made known by Thomas Graham, a Scotch chemist, (about 1861), who had made a study of Diffusion, and had written several works upon that subject. Since then it has been somewhat employed in chemical work and attempts have been made to introduce it in the industrial arts by means of an apparatus called a Dialyzer, a simple form of which is here illustrated.

This apparatus may be made by any one, without expense, and is sufficient for the requirements of most retail druggists.

Larger apparatus may be made on the same principle. It consists of an ordinary glass lamp-shade, the bottom of which is covered over with parchment paper, which is large enough to extend up the sides of the shade nearly two inches, and which is held in place by a string or rubber bands. The solution to be dialysed is placed in the apparatus constructed, and floated on distilled water, contained in a convenient earthenware vessel. (An earthenware milk-pan which is shown in the cut, is convenient for the purpose, or an ordinary wash-bowl may be used.) The dialyser may be suspended by a string from above, or set upon bottles in the earthenware ves-



sel, so that the surface of the liquid in the dialyser may be about level with the surface of the water in the vessel.

PARCHMENT PAPER for this purpose may be made by immersing firm unsized paper in a mixture of two measures of sulphuric acid with one measure of water, and afterwards washing it thoroughly with pure water to remove all traces of acid. It may also be bought, at a small price, of jobbers or dealers in pharmaceutical supplies.

Dialysis is applicable only to aqueous solutions, and the process is sometimes used to obtain the colloid, and sometimes the crystalloid principles from their solutions. The colloid substances are always retained in the floating vessel or dialyzer, while the crystalloid substances are found in the water upon which the dialyzer floats. The liquid contained in the vessel upon which the dialyzer floats is called "diffusate." In working the process to obtain the colloid substances, the water in the vessel should be changed every day; but in working it to obtain the crystalloids, as little

water as is necessary for the purpose should be used, for it has subsequently to be evaporated to obtain the crystalloid substance.

Crystalloids are not always crystallizable but may be obtained either in crystals or in mass by evaporating the diffuseate.

Gum Arabic is a familiar example of a colloid, and sugar, of a crystalloid substance. If they are both represented in a solution, the gum will be retained in the floating vessel while the sugar will be gradually transferred to the water, in which it floats.

In conducting the process of dialysis it should be continued so long as the water in the vessel contains appreciable traces of the soluble crystalloid, or other substance, which the process is designed to remove. Dialysed iron is probably the most familiar colloid pharmaceutical preparation made by dialysis.

In chemistry dialysis is considerably used for separating crystalline alkaloïds or salts from colloid combinations, and is often employed in the analysis of the contents of the stomach when poison is suspected.

DIFFUSION.

In physics Diffusion is the intermingling of the molecules of two or more liquids or gases by direct contact, or by separating them with a porous membrane through which they may intermingle as in dialysis. In making beet sugar this term has come to be used as a process for extracting the sugar from the beets, by means of hot water. As this process is applicable to the extraction of other substances as well, a brief description of it is given.

The sugar beets after being properly trimmed, washed and sliced, are put into large tanks of which ten or twelve are used, being connected together by means of pipes which can be opened or closed with valves. When all is in readiness hot water is turned into the first tank and agitated for some time with the sliced beets by means of revolving paddles. The liquid is then drawn or pumped from this tank into the next one filled with fresh beets and the same operation conducted as in the first, then into the third and so on into the last tank, when it is fully charged

with saccharine matter extracted from the beets contained in the battery of tanks used. Meantime the first tank is again filled with hot water and agitated as before and the liquor passed through the tanks successively; and, if desirable, the operation is continued until the beets are entirely exhausted of their saccharine matter, when the tanks are again charged with fresh beets and the weak diffuseate which results from the third treatment is heated and used in the first tank. The liquor charged with the dissolved saccharine matter, when it is of sufficient density, is treated in various ways to purify it, and finally evaporated to a syrup from which sugar is crystallized. The liquor which is used to dissolve the saccharine matter is called a "diffusate" and the apparatus employed is called a "diffusate battery" or apparatus; the principle is that of diffusion, by solution and circulation; the same principle may be applied to the extraction of drugs and is not dissimilar to re-percolation.

DISTILLATION.

The process of vaporizing a liquid or other substance, by the aid of heat, then condensing the vapor to a liquid by cold, in an apparatus called a still, is known as Distillation.

This process is used for separating liquids of less from those of greater volatility, for separating liquids from soluble substances which they hold in solution; for separating volatile substances from grosser matter with which they are associated; for purifying and freeing liquids from objectionable matter, and for many other purposes, in the industrial arts, in the manufacture of chemicals and in pharmacy.

HISTORY. Distillation is said to have been employed by the Egyptians as early as the third century. M. Clavicula, in a "Treatise on Painting," written in the third century gives a formula which may be translated as follows: "In mixing pure and very strong wine with three parts of salt, and heating it in a special kind of vase we can obtain an inflammable water which consumes itself without burning the matter upon which it is deposited." This is the oldest reference extant to the distillation of alcohol from wine.

From Egypt the art of distilling was conveyed to the Greek and Arab alchemists; the word "alcohol" being derived from the Arabic and used in the tenth century by Arab chemists.

Distillation appears to have been introduced into Europe by the Moors about 1150 A. D. The word "Eau-de-vie" was used in the thirteenth century as a name for the spirit distilled from wine. Arnould de Villeneuve, who lived from 1250 to 1314 A. D. was the first author of a special work on distillation of spirit from wine. Raymond Lulle (1235 to 1315) also wrote about the same time on this subject and gave directions how to obtain Eau-de-vie from wine. An interesting work on distillation by Brunswick, entitled "Das Buch zu Distilliren" was printed in Germany in 1515, and in the sixteenth century the distillation of spiritous liquors was in common practice in Great Britain. In 1801 Edouard Adam of Montpellier, France, invented a still which produced a revolution in distillation in that country and established the apparatus for fractional distillation, which, with some modifications, is in use at the present time. About the same time (1801) in this country, at Bristol, Pa., Michael Krafft invented a still "which met with universal and unbounded approbation and success." This form of still is described in his work, "The American Distiller published in 1804. The principle of his apparatus is approved and adopted to this day by the distillers of this country. Since then many improvements have been made in mechanical detail, but the general principle of distillation remains unchanged.

A method of distilling or separating spirits from wine by means of ice made by the air pump was introduced by M. Raoul Pictet in 1881, and a method of cold distillation or separation of lighter or spiritous liquors from wine and whiskey by means of a centrifugal machine has been employed, but these methods have not been generally adopted.

PRINCIPLES OF DISTILLATION. When substances are vaporized by the action of heat the vapor, being generally lighter than air, rises. In distillation, advantage is taken of this physical property and the vapor is conveyed into another vessel or com-

partment which is surrounded by a cold medium, by which the vapor is condensed again into a liquid. If a simple substance, as water or alcohol, is vaporized it is recovered again, by condensation, freed from all matter that is not vaporized by the degree of heat required to convert the substance into vapor. Thus water is distilled to free it from earthy salts, alcohol to free it from water and extractive matter, etc. If a mixture of liquids which vaporize at different degrees of heat is distilled it is obvious that the substance which boils or is vaporized at the lower degree of heat, will rise before that which requires a higher degree for vaporation. Thus in a mixture of alcohol which boils at 173° F., and water which boils at 212° F., the vapor of alcohol would rise first and may be condensed before the water would be converted into vapor to any great extent.

The general object, therefore, of distillation is to separate substances of different degrees of vaporation from each other, by converting them into vapor and condensing the vapor into a liquid. In this manner liquids of different vaporizing or boiling points are separated from each other and the solutions of salts or extractive matter are separated from their diluents, when it is desirable to recover the medium which holds them in solution.

KINDS OF DISTILLATION. Two kinds of distillation are in use for various purposes—the wet and the dry. *Wet*, or ordinary liquid distillation is employed for distilling waters, spirits, ethers and all manner of liquids in which it is required to obtain a distillate without change of its chemical composition. *Dry*, or destructive distillation is employed for decomposing dry substances and separating them into their chemical constituents, which may be gaseous, liquid or solid at ordinary temperature. The distillation of coal by heating it in retorts and conducting the vapors into various chambers by which it is fractionated, obtaining gas, benzol, kerosene oil and coal tar is an example of dry or destructive distillation, the volatile substances passing over and the coke which cannot be vaporized remaining in the retort.

USES OF DISTILLATION. As applied to Pharmacy distillation is em-

ployed for recovering alcohol and ether from many preparations which are required to be concentrated by evaporation, such as fluid extracts, solid extracts, oleo-resins, etc.; for distilling medicated or aromatic waters and spirits, for obtaining ethers, essential oils, etc., and for many other pharmaceutical purposes.

In the industrial arts and the manufacture of chemicals distillation is extensively employed for freeing gases from their combinations; for making alcohol and spirits; for separating naphtha and illuminating oils from petroleum; for producing acetic acid and wood alcohol, for making glycerin, for fractionating coal-tar products, in producing linseed and other fixed oils, first extracting the oils with benzine, then distilling it off, and for many other purposes in the manufacture of commercial and chemical products.

Liquids vary greatly in their volatility, independent of their specific gravity. Thus ether, sp. gr. 0.725, boils at 37° C., (98.6° F.), alcohol, sp. gr. 0.820, boils at 78° C., (173° F.), chloroform, sp. gr. 1.490, boils at 60° C., (140° F.), carbon disulphide, sp. gr. 1.268, boils at 46° C., (114.8° F.). If a mixture of alcohol and chloroform for example is distilled, the chloroform will come over first and be condensed although it is of much greater sp. gr. than alcohol.

DISTILLATION IN PHARMACY. Although distillation is frequently directed in the Pharmacopœia, no advice or instructions are given regarding it; it being assumed that druggists are sufficiently familiar with the process to enable them to conduct it properly. A few suggestions, however, may not here be amiss.

To distil medicated waters or other aqueous substances no water bath is required, the distillation of such liquids being more rapid, and equally as satisfactory, without it. If herbs, leaves, flowers, seeds or other similar substances are to be distilled, they should be protected from contact with the still by a false bottom, so that they may not "scorch," and sufficient water should be used with them to prevent the extract which collects at the bottom from "burning down." At least double the quantity of water that is taken of the drug should be used.

To obtain oils from medicinal plants seeds, etc., the most approved method is to pass a current of steam through the herbs, or other substances, by which the particles of oil are vaporized and carried over with the steam and condensed, being afterwards gathered from the surface of the water.

To distil or recover alcohol, ether or other similar substance of less specific gravity than water, the liquid should be placed in the water bath, the still adjusted and the heat communicated by heating the water surrounding it. Steam heat is much employed for this purpose. The boiling point of alcohol or other lighter liquids being lower than the boiling water, it is vaporized and condensed in the still; the heavier liquids and the extractive matter remaining in the water-bath.

When drugs are percolated with alcohol, or a partly alcoholic menstruum, the menstruum remaining in the drug can be recovered by transferring the moist drug to the water-bath of the still and distilling in the usual manner. If the water-bath percolater and still is used it is unnecessary to transfer the drug, as the still top can be adjusted, heat applied, and the distillation completed without further trouble.

DISTILLING APPARATUS. In the art of distillation the first form of the apparatus was the Alembic, used by the early alchemists. This consisted of a base or matrass or cucurbit which held the liquid to be distilled; the head which received the vapor; and the beak or tube which delivered the distilled product into the receiving vessel.

It was usually constructed of metal but later earthenware or glass were employed, and the present form of glass retort is but a modification of the apparatus with which the pioneer chemists sought to discover the elixir of life.

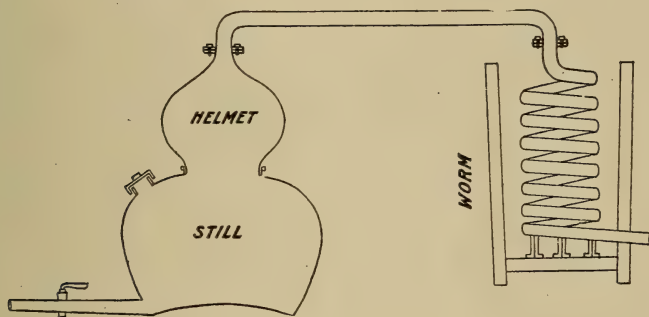
The principle of distillation has remained the same through all the centuries that have elapsed, since the first crude ideas concerning it were put in practice, but the forms of apparatus have been gradually changed and improved until, at the present time, there are a great variety of stills adapted for various uses, some arranged for heating with a naked fire or furnace, others for steam heat, others for gas and electric heating. In the apparatus for condensing there is still greater variety

than in that for producing the vapor. The simple form of still has a head or cap or capital or helmet surmounting the base, and a pipe or tube leading from it through a cistern or vessel of cold water having an exit near the bottom of the vessel through which the tube passes and discharges the liquid which is condensed into a receptacle.

In the industries stills are arranged with several condensing chambers for Fractional Distillation, that is, the separation of liquids of different vaporizing points from each other as in the distillation of petroleum; the lighter portions, benzin, etc., coming over first, then the illuminating oil, and afterwards the heavier oils, until finally only the tar remains in the boiler as residuum or residue. What is left in the still after the distillate has been recovered is called the residue.

Superheated steam is also employed in the distillation of some chemical substances, (Glycerin, for example) but it is used to produce chemical change rather than as a means of heating the substance.

For distilling common essential oils wooden chambers are constructed having a false bottom. The herbs, bark or other substances are placed on the false bottom and the steam admitted underneath. This passes through the herbs or other substance in the still and the vapor, charged with the essential oil is conducted in a pipe or worm through a cooling system where it is condensed and is finally collected in a receiving vessel where the essential oil is removed from the surface by means of flannel cloths, blotting paper, or other absorbing substance and transferred to closed vessels.



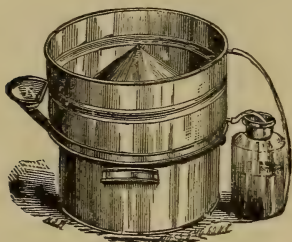
The method of separating the constituents of a body is called Fractionating, and is much employed in the industrial arts and the manufacture of chemicals. Stills are also constructed for vaporizing or liberating gases, which may be condensed by pressure to liquids or may be absorbed in an aqueous medium,—ammonia and the acid gases are examples.

For the production of spirits and alcohol, special continuous apparatus is constructed, by which the distilled product is concentrated to the desired proof strength. Steam is generally employed for this purpose as well as for distilling essential oils, and in a large way for distilling all substances which vaporize at a heat less than boiling water, 212° F., but for substances which are vaporized at a heat higher than 212° F., an oil-bath, a sand-bath or naked fire are required.

In the ordinary business of pharmacy a Pharmaceutical Still is generally employed. Fenner's Pharmaceutical Still is well adapted for that purpose and a description of it is appended hereto.

FENNER'S WATER-BATH AND STILL is a convenient, simple apparatus for evaporating and distilling. It consists of a cylindrical, shallow vessel, A, into which is fitted the shallow evaporating pan, B, (which serves as the vessel for open evaporation, and also for evaporation during distillation); and the conical still top, C, in which the vapor, which rises, is condensed during the process of distillation. This apparatus is constructed especially for evaporating and distilling; it is low and shallow, having a large bottom surface, fitting it well for rapid evaporation and distillation. Fenner's Water-Bath Percolator and Still may be employed for the same

purposes, but as it is constructed for percolation also, corresponding sizes do not present so large a surface for evaporation and distillation as does the Water-Bath and Still.



FENNER'S WATER-BATH AND STILL.

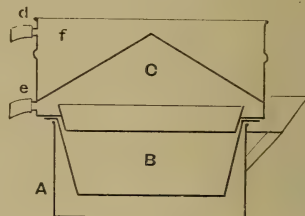
DRY HEAT PROCESSES.

The following processes in which heat is employed are frequently used in pharmacy and chemistry:

CALCINATION. The process of calcination consists of exposing metallic salts to the prolonged action of intense heat until all their combining constituents except oxygen are disassociated or driven off, leaving only the combination of the metal with oxygen—a metallic oxide. Lime, CaO , which is prepared by heating calcium carbonate, (limestone or marble) in kilns, is an example; in pharmacy calcined magnesia or magnesium oxide which is prepared from magnesium carbonate by calcination, is an example; barium strontium, iron, copper, lead, tin, bismuth and zinc oxides, also, are prepared by calcination.

COMBUSTION. The act or process of burning or consuming by means of fire or with the generation of heat is commonly known as combustion. Scientifically considered, it is the continuous chemical union of a substance with an element—generally oxygen—with the invariable evolution of heat, and, if active, of light. Combustion is of great importance in chemistry, as by it metals are converted into gases, compound substances are separated into their elements, and many combinations, not otherwise possible, are formed. Combination of refractory metals is accomplished by means of the electric arc or furnace and by the oxy-hydrogen flame. The burning of wood, coal and oil, with the production of heat and light are familiar examples of rapid combustion, smoke being the

Druggists will find it a great convenience to have the Water-Bath and Still, as well as the Water-Bath Percolator and Still, for they are often both required at the same time.



unconsumed particles or constituents combined with the gaseous products of combustion. The heat of the body of animals is caused by the slow combustion of hydro-carbons or fat in the system; this form of combustion is not accompanied by the phenomenon of light. Spontaneous Combustion is caused by the rapid oxidation of a substance which causes heat sufficient to ignite the substance.

DESICCATION. The act or process of drying a substance is called desiccation. This term is more commonly applied to the drying of fruits, vegetables or meats, and it is generally understood that the substances are to be prepared in some way, by slicing, grating, shredding, etc., so that in the process of desiccation they may be quickly and thoroughly dried. Desiccated Coconut is an example. In pharmacy and chemistry the drying of delicate and deliquescent salts is effected by means of an absorbent salt placed with the substance to be dried in a Desiccator; the absorbent salt attracts the moisture and leaves the substance free to dry.

A **DESICCATOR** is an apparatus for drying or desiccating—a drying oven so arranged that heat may be applied and a current of air passed through it which removes the moisture.

EXSICCATION, is another process of drying but this term usually relates to the drying out of the water of crystallization from chemical salts, as exsiccated alum, dried alum, commonly called burnt alum. It is properly the same as desiccation but is applied to a different class of substances. Exsic-

cated or dried alum, plaster of Paris, or dried gypsum, dried ferrous sulphate and dried sodium carbonate are the only official exsiccated salts, but others are frequently prepared for various purposes. A shallow porcelain dish containing the substance to be exsiccated is heated on a sand- or water-bath until the water of crystallization is evaporated.

Exsiccation may be defined as the evaporation or drying out from chemical salts of all, or a part of their water of crystallization, by means of heat continued until the salt ceases to lose weight. It does not always occur that exsiccated salts are anhydrous. Dried alum is without water of crystallization; dried ferrous sulphate consists of two molecules of the anhydrous salt combined with one molecule of water, dried sodium carbonate may be made anhydrous but the *Pharmacopœia* preparation contains two molecules of water.

FLAME. The color of flame produced by combustion is frequently characteristic of the substance consumed. The substance in powder may be sprinkled into a jet of flame or on heated metal, or its solution, if soluble, may be absorbed by test paper and burned in a flame giving a characteristic color; or a small loop of platinum wire may be dipped in a solution of the substance to be tested and then heated in a non-luminous flame, when it will give the characteristic color of the metal.

FLASHING POINT. The temperature at which the vapor of an inflammable substance, as gasoline, illuminating oil, spirits, etc., will take fire when heated is called the flashing point. The flash test is used for testing illuminating oil. The oil is heated and a lighted match passed above it; the temperature to which the oil is heated when the vapor takes fire or flashes is called the flashing point. In New York State this must not be less than 100° F., and 110° F., is the regulative standard.

FUSION. The act of liquifying or melting a solid substance, by the aid of heat, is called fusion. Fats, stearin, wax, etc., may be liquified or fused at a comparatively low degree of heat. Aqueous fusion is a term applied to the melting of crystalline bodies containing water of crystallization, as alum

or sugar, which require but a comparatively low degree of heat to melt or fuse. Dry fusion is the fusion of the residue of a crystalline body after its water of crystallization has evaporated; a higher degree of heat is required than for aqueous fusion. Igneous fusion is a term applied to melting or fusing of metals which require generally a higher degree of heat than other substances to which fusion is applied. The degree of heat at which solid substances become liquid or melt is called their melting point. When different metals are melted together to form an *alloy*, the melting point of the alloy is not necessarily a mean of the proportion of the ingredients, but is influenced by the molecular union of the new compound which is formed. The temperature of non-volatile metals and substances may be increased above their melting point to a "red heat" or "white heat" which occurs at a higher temperature. Incandescence denotes the state of being luminous, induced by heat; it may occur either with or without fusion. Fusion of substances requiring only moderate temperature may be accomplished in tin, copper, aluminum or porcelain vessels. Metals of comparatively low melting point may be fused in iron or steel vessels; those requiring a very high degree of heat require to be fused in crucibles, which may be made of clay, plumbago or platinum.

Fusion is employed in metallurgy to purify metals, to separate them from each other and to combine them in alloys; in chemistry it is frequently used in analysis; in pharmacy it is quite generally used in melting fats, waxes, etc., and for melting crystalline bodies.

IGNITION. In a general manner to set afire. In chemistry ignition is the act of heating to the point of incandescence, or to a high degree, any substance or precipitate, for the purpose of expelling organic or volatile matter. In making analysis, precipitates are often heated in a crucible or platinum capsule to an incandescence to expel all substances that may be driven off by a high degree of heat. Every substance has its igniting point, or the degree of temperature at which it takes fire. The igniting point is often important in determining the identity of a substance. Reducing agents are frequently added to metals or precipitates, they ignite at

a certain degree of heat, thus aiding in identification.

INCINERATION is the process of reducing to ashes and is employed chiefly in analytical work. The substance, if combustible, is burned and the ashes collected, or a solution of a soluble substance may be absorbed with test paper, dried and burned, and the ashes tested.

SUBLIMATION. Certain solids are vaporized by heat, and the process by which they are converted into vapor is termed sublimation. The vapor thus produced may be allowed to escape or may be conducted into a receiver and condensed into a solid which is called a *sublimate*. The process is analogous to distillation, except that solid substances are volatilized and condensed into solids instead of liquid form. Certain metals are freed from their ores and certain salts are prepared, separated or purified by sublimation. Different degrees of heat are required for volatilizing different substances, and the products are gathered or condensed in different forms of receptacles or chambers. The process of sublimation may be conducted to free metallic or other substances from gaseous or volatile constituents which are not worth saving, or for freeing and collecting the volatile substance or sublimate. Several of the salts of ammonium, mercury, sulphur and arsenic are obtained by sublimation, as also camphor, benzoic acid, iodine and some other substances used in pharmacy. Sublimation is also considerably employed as a means of analysis, especially in the detection of poisons, arsenic, corrosive sublimate, etc.

TORRIFICATION. The process of roasting or torrifaction is employed extensively in metallurgy, chemistry, and the production of food products. This process consists in heating the substance to a degree of heat required for the purpose, either in the open air or in an enclosed apparatus, or revolving cylinder, so arranged that it can be stirred or agitated, in order that all parts of the substance may be uniformly heated. In metallurgy ores are roasted to free them from constituents that may be volatilized, as sulphur in sulphide ores. In the production of chemicals this process is extensively employed. In making chocolate, coffee and various cereal food products, roasting is a very important process.

EVAPORATION.

EVAPORATION is the disengagement of vapor from the surface of a substance at any temperature which is sufficient to overcome the cohesion of its molecules.

Evaporation occurs in some liquids at ordinary temperature and in others is induced by the application of heat. Very slow evaporation at ordinary temperature is termed Spontaneous Evaporation. Vaporization is the term usually used to designate the disengagement of vapor at the boiling point of the substance.

VOLATILIZATION is a similar term, but is more generally used to signify the disengagement of a gas from a liquid or substance with which it is combined.

The physical principles of evaporation as vapor tension, latent heat, atmospheric pressure, molecular attraction, etc., belong more properly to the domain of Physics and will not be discussed in this article.

Natural evaporation of water by the heat of the sun, and the production of salt by the evaporation of salt water are familiar examples of solar evaporation. In the industries and in the manufacture of chemicals evaporation plays a very important part and is an essential in many of the pharmaceutical processes, as crystallization, distillation, etc.

As applied to pharmacy, evaporation is the process by which, with or without the aid of applied heat the volume of liquids or other substances may be reduced. It is employed for many purposes in the practice of pharmacy, and is so familiar to druggists, that but little need be said regarding it in this article.

The vessels used for evaporating should be broad and low, or shallow, to give a larger surface for the application of heat and the escape of vapor. Evaporating dishes are made of glass, iron, (enameled or glazed), platinum, porcelain, tin, etc.

For rapid evaporation, heat on a stove over an open fire, or by means of steam is best; but for making many preparations, such as extracts, fluid extracts, etc., slower evaporation is necessary, that the preparation may not be injured by heat. For this purpose the water-bath* is the most convenient for druggists' use, as by it the

heat can be regulated and maintained at any desired temperature. In large establishments, the vacuum pan, which is still better for the purpose, is employed. This consists of a large pan and chamber covering it from which the air has been removed by means of an air pump, causing the liquid in the pan to evaporate at a much lower temperature than in the open air.

The most serviceable cheap evaporating dish, is the ordinary granite-iron stove skillet or frying-pan. Any ordinary evaporating dish may be set in a vessel of water, which will answer as a water-bath. A sand-bath may be made by partly filling an iron basin with sand and setting the evaporating dish in it.

*The water-bath which forms a part of Fenner's Water-Bath and Still is very convenient for the purpose of evaporation. It is shown in the sectional views by the vessels A and B. Fenner's Water-Bath percolator may also be used for the same purpose, it being necessary only to put the liquid to be evaporated into the percolator and leave off the cover.

For very slow evaporation a warming closet may be made, by fastening a box against the wall and heating it with a lamp placed underneath a hole in the bottom; smaller holes should be provided in the upper surface for the escape of vapor. This box can be so arranged with shelves that a number of evaporating dishes may be placed in the same. A similar arrangement may be constructed over a steam pipe or register. More elaborate apparatus may be obtained from manufacturers of chemical and pharmaceutical ware.

EXPRESSION.

The process of expression is employed more or less for many uses in pharmacy, the apparatus and manner of working being governed by what is required to be done.

In making tinctures, fluid extracts, etc., a considerable quantity of menstruum is left in the drug after the percolation is completed, and it is economy to recover it by pressure in a tincture press or other suitable apparatus; pressure is also employed as the chief operation of the pressure process for Fluid Extracts. In choosing a tincture

press for any purpose it is not economy to get the smallest sizes, a one or to gallon press being none too large for most pharmaceutical work. The drugs to be expressed should be inclosed in a coarse burlap bag or cloth, and the pressure should be long continued rather than too quick and forcible, that the liquid may have time to become separated from the drugs. In pressing pulpy or mucilaginous drugs it is of advantage to mix them with some loose non-absorbent material, rice-chaff, for example, to facilitate the operation. Fruit juices in a small way, are best expressed by hand pressure, except fruits as lemon, orange, etc., which can be pressed with a lemon squeezer. In a large way fruit may be pressed in large wooden presses, or by hydraulic presses, the latter presses being the best for this purpose. In using small presses nothing is gained by trying to press too much at a time, the operation being more satisfactory in smaller quantities.

There are several kinds of good presses to be had for pharmaceutical purposes, the "Enterprise" being as convenient and serviceable as any. There are several so called "pressure percolators" now sold, but, in our opinion, they are not convenient percolators, and they certainly fail to do the work of a press.

EXTRACTION.

The various methods by which the soluble constituents of organic drugs may be separated from the inert or insoluble matter with which they are associated may be termed extraction. A number of processes which are elsewhere considered may be employed as a means of extracting the soluble properties of drugs. Maceration or digestion, infusion or decoction, and the various forms of percolation and pressure are the processes generally employed. Infusions, decoctions, fluid and solid extracts, some of the solutions, the medicated vinegars, abstracts, the alkaloids, many of the elixirs, some of the mixtures, the pharmaceutical oleoresins, the resinoids, some of the spirits, the tinctures, some of the syrups and some of the medicated wines are produced by extraction in some form.

FERMENTATION.

Fermentation is a natural operation induced in certain substances by the presence of minute organisms called "ferments." The most familiar examples of fermentation are seen in the production of bread, wine, beer and vinegar. In the first three named the action is apparent because it is accompanied with the liberation of carbon dioxide, which causes the bread to "rise," and the wine of beer to effervesce. In the production of vinegar no such visible action appears, but a change nevertheless, occurs; and it is known that the alcohol contained in the liquid has been changed by the action of the ferment to another substance having entirely different characteristics.

In the first instance sugar is converted into alcohol by the action of the ferment, and in the last, the alcohol is converted by the action of another ferment into acetic acid.

The ferment which causes fermentation in bread, wine and beer is the yeast plant *Cerevisiæ fermentum*, and in vinegar, the vinegar plant *Mycoderma aceti*.

A great number of other ferments are known, and science has demonstrated that many diseases are caused by the action of ferments in the fluids or tissues in the system, and that the physiological processes of nutrition are dependend upon the action of ferments, which prepare the food stuffs for assimilation.

In pharmacy but little use is made of fermentation, therefore the subject is not elaborated here, but is mentioned as being essential in the production of liquors, wines, vinegars, etc., under which heading it is described.

FILTRATION.

The process of separating insoluble matter from liquids, by means of any substance or medium which will prevent its passage, is called filtration.

Filtration, as it is employed in pharmacy, is usually conducted by means of filtering paper contained in a conical receptacle called a funnel;* but larger operations are carried on by other contrivances which will admit of more rapid filtration.

The process of filtration is so familiar that it needs no explanation; but a few suggestions are here made for the benefit of the inexperienced.

In filtering a liquid which contains a precipitate (unless the precipitate is designed to clear the liquid, as magnesia or calcium phosphate, talcum or pumice stone), the liquid should be poured carefully off and filtered first, the precipitated portion being added after most of the liquid has passed through the filter; this makes the process more rapid.

The first portion which passes through the filter should be returned to it and refiltered, as, when the filter is dry, it admits of the passage of small particles which are retained when its fibres have had time to swell by the absorption of moisture.

In filtering liquids containing albuminous or gummy precipitates it is also an advantage to put a coarse cotton cloth strainer on the inside of the filterpaper; this catches the precipitate or albuminous substance which may be removed with it, or in which it may be pressed to strain out the liquid, and thus make the filtration more rapid.*

A little charcoal powder, or powdered pumice-stone sprinkled in the filter, will often assist to clear preparations that are difficult to filter clear.

A plaited filter is generally used, except when a filter-rack is employed, then the ordinary folded (quartered) filter is used.

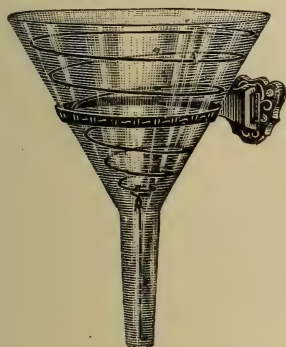
Besides filtering through paper, other means are often employed by druggists. Syrups and heavy liquids may be filtered through a flannel or cotton strainer or bag, or felt filters that are made expressly for this purpose may be used. Charcoal and sand, in alternate layers, are employed for filtering light liquids when large quantities are to be filtered.

Pressure filters, by which liquids are filtered through felt or canvas, by means of horizontal screw pressure and apparatus arranged for mixing filtering paper pulp with liquids and drawing off by means of a siphon, overflow or stop-cock, and other rapid filtering devices are used in large establishments.

For various manufacturing purposes filters of large capacity are constructed in which filtering paper pulp

is used in sections or layers, the machine acting as a press to compact the moist paper pulp and make it more effective for filtering purposes. These filters are used for filtering beer, fruit juices, syrups and many other liquids required to be filtered in large quantities.

*Fenner's Spiral Filter Rack is a convenience for keeping the filtering paper off the sides of the funnel when filtering. It is made of tinned steel wire of different sizes to fit different size funnels.



It is simple, cleanly, durable, efficient and cheap. The cut shows it as it is adjusted in the funnel ready for use.

Heat often assists the process of filtering heavy liquids or oils. It may be conveniently applied by putting a filter inside of Fenner's Water-Bath Percolator, and applying heat by means of the water-bath. For supporting the funnel during filtration, Fenner's Funnel Rack, which is shown in the cut is very convenient.

Further remarks on filtering will be found in the article on "Economy in Percolating and Filtering," printed elsewhere in this work.

GRANULATION.

The process by which substances are reduced to granules or grains of nearly uniform size is called *granulation*. Vegetable drugs are granulated or reduced to a coarse uniform powder for dispensing or percolating by means of a grinding apparatus. Sugar and many of the crystalline salts are granulated during crystallization and drying by

stirring or by revolving them rapidly in a centrifugator which keeps them in motion and at the same time free from moisture. Many of the chemical salts are furnished in granular form, being more convenient for dispensing, as granular potassium bromide, potassium iodide, etc., also gums, as gum arabic, being more soluble in granulated form than in powder. Effervescent salts are prepared in masses by moistening them with some liquid that will not effect their solution, and rubbing them while moist through a coarse sieve which breaks the mass into small fragments, which form they retain when dried. They present a large surface to the solvent employed when they are used, thus dissolving rapidly. Granular effervescent salts are quite popular as a means of mild medication. The method of making them is fully described under effervescent salts. <Part II.

INFUSION AND DECOCTION.

The process of *Infusion* consists in steeping drugs at a temperature below the boiling point of water, in an aqueous or other menstruum, for the purpose of extracting their soluble medicinal constituents. For this purpose "infusion pots," that contain a perforated cup or receptacle for the drug, which is surrounded by hot water during the operation, are furnished by manufacturers of chemical ware. A covered granite-ware or earthen-ware vessel will answer the same purpose; the water-bath percolator is, however, the best adapted of any apparatus for the purpose of infusions, as the heat can be maintained and the liquid drawn off by the stop-cock whenever it is desired. For making infusions boiling water is usually poured upon the drug; the vessel covered and allowed to remain in a warm place for half-an-hour. The contents of the vessel are then poured upon a strainer and enough boiling water then poured through the dregs to make the infusion measure twenty times the weight of the drug taken.

The process of *Decoction* consists in boiling the drugs in a aqueous menstruum for fifteen minutes or longer to obtain their soluble properties. This may be done in an open or covered

vessel, but the process is now but little employed. The water-bath percolator is a very convenient apparatus for decoctions, as the heat may be maintained to boiling for any length of time, and the liquid then drawn off by the stop-cock. The general formula for decoctions directs twenty parts of liquid to be prepared from one part of the drug.

MACERATION.

When maceration came to be an official process for exhausting drugs, maceration, the process of our forefathers, was mostly abandoned, but we are glad to see that in the present pharmacopœias its value is again recognized, and that many preparations, which have of late been made by percolation, are now again made by maceration. In addition to this, the new pharmacopœias in making the most of the tinctures and some extracts, give the very much needed direction to macerate twenty-four hours with a portion of the menstruum before packing in the percolator. Maceration is the necessary primary step to successful percolation. It softens the drug, dissolves its soluble properties and loads the menstruum with them, ready to be carried away by the subsequent process of percolation.

The present U. S. P. directs maceration for making several tinctures that were formerly made by percolation, and the Br. P. directs maceration for from twenty-four to forty-eight hours as a preliminary step to percolation in making tinctures, etc. The German, French and other continental European authorities direct maceration mainly for obtaining the strength of drugs; and although percolation, when properly conducted, has great advantages over any other process for obtaining the strength of drugs, without maceration it fails to accomplish its full purpose.

Whenever percolation is employed, sufficient time should be given for maceration to loosen and dissolve the soluble properties of the drug. If alcohol is the menstruum employed, the maceration may be conducted after packing the percolator; but if water forms a portion of the menstruum, the drug should first be macerated with a

portion of the menstruum sufficiently long to allow it to swell before it is packed in the percolator.

Any convenient covered vessel may be used for macerating drugs designed to be percolated. For small quantities, glass, specie or salt mouth jars, earthen-ware fruit jars, or covered granite-ware stew pans are very convenient, even tin cans will not be injurious to most drugs. Drugs to be thus macerated should be thoroughly moistened with a portion of the menstruum and covered to prevent exposure and evaporation. When preparations are prepared entirely by maceration, the drug should be put into a suitable glass jar or covered vessel, the menstruum added and the jar or vessel set in a warm place which should be frequently agitated for several days.

LIXIVIATION.

The process of *leaching* or extracting the soluble constituents of ashes or chemical deposits by percolating them with water or other solvent is called "Lixiviation."

Wood ashes are leached with water to obtain lye which is afterwards converted into potash. Earths or shale containing saltpetre or alum are percolated with water and the soluble salts afterwards obtained by condensation and crystallization. Borax is obtained from the deposits in basins of evaporated lakes, treated by lixiviation, etc. Either hot or cold water or other solvent may be used for the process, which is practically a washing out of the soluble from the insoluble constituents of the material employed.

This process is extensively used in industrial chemistry and in chemical analysis of ashes, soils and earthy deposits, but is little used in the ordinary business of pharmacy.

PERCOLATION OR DISPLACEMENT.

Percolation is a process of pharmacy in which a liquid called a Menstruum, is caused to pass or filter through a powdered drug contained in a percolator, for the purpose of displacing and obtaining the soluble constituents of the drug.

The principle of percolation is that of lixiviation or leaching from which it is derived, (see Lixiviation). The name is derived from the Latin, *percolo*, to strain or filter through.

When a menstruum is poured upon a powdered drug contained in a percolator, and allowed to remain for some time, it absorbs or dissolves whatever constituents of the drug are soluble in the menstruum employed. When the saturated menstruum is then allowed to pass through the drug, (more liquid being poured upon it) it carries with it whatever it has dissolved of its soluble constituents and when the fresh liquid passes through the powder it is, in turn, charged with dissolved properties. The first portion which passes through the drug is much stronger of its solubilities than succeeding portions. If sufficient menstruum is used the drug is exhausted; that is, all of its properties soluble in the menstruum used have been removed and are contained in the percolate, which is the menstruum charged with the soluble constituents of the drug.

HISTORY. The process of Displacement or Filtration by Displacement as it was first called, seems to have been introduced into pharmacy by Messrs. Boulay of Paris, in the year 1833. It was not, at first, received with great favor, but as its merits were made known by different experimenters it soon came to be popular and was introduced as an alternative process in making some of the tinctures in the 1840 U. S. P. For example; *Tinctura Cinnamomi* (Tincture of Cinnamon) was prepared either by maceration or by displacement. "Take of Cinnamon, bruised, three ounces, diluted Alcohol, two pints, macerate for fourteen days, express, and filter through paper. This tincture may also be prepared by thoroughly moistening the cinnamon, in powder, with diluted alcohol, allowing it to stand for forty-eight hours, then transferring it to an apparatus for displacement and gradually pouring upon it diluted Alcohol until two pints of the filtered liquor are obtained." <U. S. 1840. The process as then employed, was not known as percolation, but as a *method of displacement*. The U. S. P. of 1840 refers to it as "the kind of filtration commonly call-

ed displacement." The apparatus used, although essentially the same as the common percolators now employed, was called the Filter of Boullay.

A little later a percolator of similar form was arranged by M. Beot, to be operated in connection with an air pump, by which the air was exhausted from a receiving vessel, into which the percolator was closely fitted, so that the liquid was forced through the powder in the percolator by atmospheric pressure, making the operation much more rapid than by ordinary percolation. This principle is now extensively used in large establishments in making extracts, fluid extracts, etc. In 1864, Dr. Redwood, of the Pharmaceutical Institution of Great Britain, invented a percolator which proved quite effective, and in 1866, Dr. Squibb recommended the process of re-percolation, (also called fractional percolation) for making fluid extracts, and devised apparatus for conducting the process. (See Fluid Extracts). With the advent of fluid extracts, about 1850, percolation began to assume a very important place among pharmaceutical processes, and, although many kinds of percolators have been produced, the principle remains the same and the process is considered the most important of any used in pharmacy.

DIRECTIONS FOR PERCOLATION. The directions for percolation are very complete and minute in the U. S. P.; to which our readers are referred.

The U. S. P. directions cover the whole *general* subject of percolation, and the remarks which follow are intended as *special* consideration of improved methods, and the difficulties which may arise in applying a general rule to treatment of a variety of substances.

The fineness of powder to be used for percolation has been discussed under the article on fineness of powders, but it may here be repeated that the powders directed in the formulas of the pharmacopœia are, as a rule, too fine for successful percolation, and that the majority of druggists will have "better luck" to choose a grade coarser of powder than is specified in the official formula.

Moistening the drug is discussed in the official process, and in the article

on maceration, and it need only be remarked that it is of great importance to have the drug thoroughly and evenly moistened. Many druggists are in the habit of putting the drug in the percolator and pouring the menstruum on it to moisten it, without even stirring it up; this should never be done, for, frequently, a portion of the drug will "cake" so that it will not become moistened during the entire process of percolation. The drug should *always* be moistened in a basin or other vessel before being put into the percolator.

Macerating before percolating is discussed in the article on maceration. It may here be repeated, however, that when water is used as a portion of the menstruum for percolation, the drug should be moistened with the menstruum and allowed to macerate for twenty-four hours, in order that it may swell before, instead of after, packing in the percolator.

Packing the percolator. In packing the percolator much depends upon the nature of the drug, the fineness of the powder, etc. Loose, fibrous, or bulky drugs, such as arnica, stillingia, buchu, etc., cannot be packed very firmly, but should be made as compact as possible; heavy drugs, such as aconite root, valerian, golden seal, etc., do not require so much pressure, but will pack much firmer; soft, spongy, or gummy drugs, such as rhubarb, orange peel, colocynth or squill, should not be packed very firmly; coarse powders, as a rule, should be packed more firmly than fine. The percolator should be packed from the outside toward the center and as evenly as possible. A disc of paper and then a cover of perforated tin or aluminum should be placed upon the surface of the powder after it is packed, to secure the even distribution of the menstruum as it is poured upon the drug. A glass or earthenware weight may be used with advantage to hold the drug in place. It should generally be allowed to macerate for some time after the menstruum is poured on before beginning to percolate.

The flow of percolate may be regulated by the rubber tube, as directed in the official process; by a loose cork in the bottom of the percolator; or, if the water-bath percolator is used, by the stop-cock. The rapidity with

which the percolate should flow depends very much upon the nature of the drug, and the quantity required to be obtained as compared with the quantity of the drug being percolated, for example, fluid extracts should not be percolated so rapidly as tinctures, nor aconite as rapidly as buchu.

With a certain class of drugs, the alcoholic or hydro-alcoholic menstruum with which the percolation is conducted, may be forced out by adding water after the menstruum has disappeared from the surface of the drug, thereby making a saving of alcohol; but with others, which soften or make precipitates with an aqueous menstruum, the percolation must be conducted to the end with the same menstruum. The menstruum remaining in the drug after percolation, may be pressed out with a tincture press and the alcohol recovered from it by distillation.

Drugs Difficult to Percolate.

Many drugs present difficulties to the ordinary methods of percolation and require a special treatment; this is generally given in the formula in which they are found; but they may be classified in a general way as follows:

1. Drugs that soften or make a pulpy mass upon the addition of the menstruum, such as orange, gentian, rhubarb, squill, colocynth, etc. Such drugs should be well moistened and macerated before packing; they should be rather coarsely powdered and rather loosely packed, and the percolation, when begun, should be continued rapidly and continued to the end with the same menstruum.

2. Gums and gum-resins which agglutinate or mass together when the menstruum is added. These should be mixed with an equal bulk of sand, or rice chaff, and not packed closely but placed loosely in the percolator, and the percolation conducted in the usual manner.

3. Bulky drugs, like arnica, buchu, chamomile, etc. Although these drugs are not difficult to percolate, they absorb so much menstruum that the expense of making their preparations is considerably increased. These should be packed as firmly as possible, and held down in the percolator with a weight during the process of percolation. After the percolation the mass

should be pressed to recover the surplus menstruum, which may be labelled and used again when preparations of the same kind are to be made.

Economy in Percolating and Filtering

Much loss of alcohol occurs by evaporation when the ordinary percolator or filtering funnel are left uncovered during the percolation or filtration. To remedy this difficulty a simple apparatus may be constructed by any druggist who will take the trouble. It is shown in use in the following cut.

the cover when completed, is like a drum head, and, when it is used to cover a percolator or funnel, will make by its own elasticity, an air-tight covering. The rubber may be more conveniently fastened with a double hoop, the same as is used by ladies in making embroidery.

B, is a funnel tube, so bent as to prevent evaporation or access of air. Through it, fresh menstruum or other liquid may be introduced into the percolator or funnel. A glass or metal tube answers the same purpose and



A, is the wooden cover, large enough to fit the top of a percolator or funnel; it is bound with a wooden hoop whose lower edge projects about half an inch below the under surface of the cover; to the wooden hoop is tacked a piece of moderately thin sheet rubber, so that

may be stopped with a cork. This tube may be adjusted by boring a hole in the wooden cover and punching a small hole in the rubber, so that it will fit snug around the tube.

C, is a rubber tube attached at one end to a glass tube in the cover (which

passes through the rubber as heretofore described), and at the other end to a tube in the stopper of the receiving bottle. This tube allows the air to pass from the receiving bottle into the percolator, and as the liquid fills the bottle the air is forced from it into the percolator or funnel.

D, is a rubber tube attached to the percolator that connects with a tube in the stopper of the receiving bottle, through which the percolate passes; if the lower end of the percolator is too large for the rubber tube, a perforated cork, into which a glass tube is inserted, may be placed in the neck of the percolator for this purpose, as is directed in the pharmacopœia process. By raising or lowering the percolator or the receiving bottle the flow of the percolate can be made more or less rapid, as it works on the principle of a siphon. A receiving bottle may be made of any wide mouth bottle, holes being bored in the cork for the insertion of the tubes to which the rubber tubing is attached.

E, shows the perforated diaphragm of the percolator.

With this simple arrangement percolation or filtration can be carried on for any length of time without exposure or loss by evaporation.

Water-Bath Percolation.

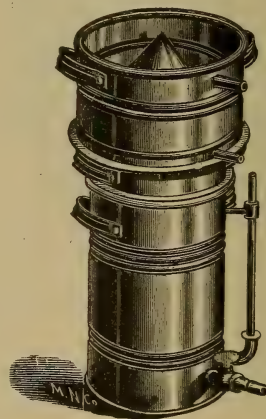
The process of water-bath percolation consists in subjecting the powder contained in a percolator surrounded by water, to the action of a warm menstruum during the entire process of maceration and percolation. By means of the water-bath the menstruum and powder are kept at any desired degree of heat for any length of time.

It is claimed for this process, that the heat employed is of great aid in effecting the solution of the soluble constituents of the substance or substances which are being exhausted, and therefore, it is much more rapid, efficient and economical than the ordinary method of percolation.

By consulting the solubility tables which may be found in the pharmacopœia and other standard works, it will be seen that the medicinal principles of vegetable drugs (especially the alkaloids and other substances in which their value chiefly consists), are from

several to a hundred times more soluble in boiling water or alcohol than in cold. Although the heat employed in water-bath percolation is seldom so high as boiling alcohol or water, yet the solubility of the medicinal constituents is relatively increased according to the heat employed; and as the object of percolation is to exhaust the drug of its soluble medicinal properties no other argument than this for the application of heat during percolation seems necessary; for it is evident that the value of the drug is much more faithfully represented in the preparations made in this manner and, that in making fluid or solid extracts, or other concentrated preparations, a much less quantity of the menstruum is required to exhaust the drug, than when cold percolation is employed.

As the question may be asked by many if heat does not injure the preparations, it may be stated here that the degree of heat directed cannot be injurious, as it is insufficient to volatilize any of the medicinal properties of the drugs.



Fenner's Water-Bath Percolator

The method of conducting water-bath percolation is as follows:

The powdered drug is to be moistened with a portion of the menstruum and either packed in the percolator at once, or after macerating twenty-four hours, as the formula may direct. A certain quantity of the menstruum (as directed in the formula) is then to be poured upon the drug and it is allowed

to macerate for a specified time in a warm place. It is then to be heated (as directed in the formula) for a certain length of time and the percolation then begun and continued until the drug is exhausted, or until the required amount of percolate is obtained.

The same general directions for packing the percolator and keeping the drug covered with the menstruum, regulating the flow of the percolate, etc., as are specified in the official processes, should be observed.

In the formulæ contained in this book for making preparations by water-bath percolation, it is directed, after packing in the percolator and adding menstruum to the drug, to "set in a warm place" for a certain length of time to macerate; by this is meant that the percolator and its contents should be heated from 30° to 35°C. (86° to 95°F.), by any convenient means. In summer a warm place in the store will suffice; in winter a shelf by the stove or other heating apparatus will do; or a box, with a hinged door and holes in the bottom about the size of the bottom of the percolator, may be fastened to the side of the wall and the heat may be maintained by a coal oil lamp placed beneath the percolator.

In large establishments warming-closets heated by steam pipes or other means may be arranged. It is not absolutely necessary that heat should be maintained during maceration, but better results will follow if it is.

The directions in the formula "heat very moderately" means that the temperature should not be higher than 40° to 45°C. (104° to 113°F.), "heat moderately" means that the temperature should not exceed 60° to 65°C. (140° to 149°F.)—a higher temperature than this is seldom necessary.

After the percolation is concluded, if sufficient alcohol is retained in the drug to be of value, it may be recovered by distillation. The amount of alcohol or other menstruum retained varies with the nature of the drug—from one-fourth to more than its original weight. In making any considerable quantity of a preparation, it is important to save this menstruum—which would otherwise be wasted—by distillation, as stated in the article on distillation.

PRECIPITATION.

For many purposes in pharmacy and chemistry it is required to precipitate (throw down) certain insoluble salts or substances from their solutions. For example; if hydrated ferric oxide is required, solution of ferric sulphate is precipitated by adding it to diluted ammonia water, which causes precipitation of insoluble ferric hydrate. In a similar manner many chemical salts are obtained, also many principles of plants, concentrates, resinoids and other substances may be separated from their solution in various media.

In industrial chemistry precipitation is extensively employed, both to free a liquid from any objectionable constituent held in solution and to obtain the precipitate disengaged from its solution. Precipitation is also a very frequent process in analysis to determine the composition of solutions by chemical reaction.

Washing Precipitates.

The object of washing fresh precipitates is to free them from soluble salts, or other substances with which they are associated, which are soluble in water.

The usual manner of washing fresh precipitates, in a small way, is to pour them upon a wet muslin strainer and filter water through them until the soluble matter has been all washed out.

This method is open to several objections: 1st, exposure to the atmosphere, which rapidly oxidizes many salts, especially the iron salts, rendering them insoluble; 2d, waste, as considerable of the precipitate is washed away by this method; 3d, inconvenience, as it requires the continued attention of the operator.

Another method is to wash the precipitate in a large jar or earthenware crock, by pouring upon it a quantity of water and stirring thoroughly, then allowing the precipitate to settle, drawing off the supernatant fluid with a siphon, pouring on more fresh water, stirring, allowing to settle, and thus continuing until the soluble matter is washed out; and then draining the precipitate upon a muslin strainer.

The best method, however, is to make the precipitate in a tall jar or crock, filled with water; then having fastened a piece of rubber tubing to

each end of a stick, insert it in the jar in such a manner that a stream of water passing through one rubber tube will reach to the bottom of the vessel, while the water at the top of the jar will be carried off by means of the other tube which acts as a siphon. The water to wash the precipitate can be supplied from a water pipe, or from a bucket set above the washing apparatus, into which the tube is inserted as a siphon. The same result will be accomplished by running the tube, through which the water is supplied, to the bottom of the jar and allowing the water to overflow at the top.

It will be seen that by this means the precipitate is continually washed, and that it is not exposed, or wasted, as only clear water is drawn off at the top of the jar, because the precipitate has time to settle away from the surface of the water where the waste tube is attached. Precipitates are rapidly and thoroughly washed by this method. When the soluble substances have all been washed out the precipitate should be poured upon a muslin strainer to drain, the water may then be pressed out and the precipitate dissolved or dried as required.

REFRIGERATION.

The physical process of reducing the temperature of substances is called refrigeration. This is applied by various means and for various purposes. It is extensively used to prevent or delay fermentation and decomposition, as in the manufacture of beer and wines, and in the preservation of meat and vegetables. In chemistry it is an important aid in the manufacture of many chemical products, and in pharmacy it is considerably used in making preparations, as suppositories and other preparations that require to be chilled during their manufacture.

Refrigeration may be accomplished by means of ice contained in a refrigerator, or by surrounding the substance to be chilled with ice or a refrigerating mixture, or by means of refrigerating machinery in which ammonia or other gas is liquified by pressure and then released in pipes or tubes, the expansion causing absorption of heat, or by circulation of cold brine, (solution

of common salt), through pipes. The production of ice and cold by *artificial refrigeration* has become an important and useful industry in making ice and in cold storage plants, and in many manufacturing establishments where a low temperature is required.

SEPARATION.

Separation is a term frequently used in chemistry and pharmacy to denote the parting of substances from each other. It occurs naturally in many substances; (as cream separates from milk), and by some act or process in others, as butter is separated from cream by agitation or churning.

Separation is caused or induced in many of the common operations conducted in the industrial arts, in chemistry and in pharmacy. Metals are separated from their ores by fusion or smelting, by amalgamation and by electrical action. Fixed oils are separated from animal and vegetable substances by pressure, and from some by the aid of heat. Volatile oils are separated from plants by distillation. Alcohol and spirits are separated from fermented liquors by distillation, naphtha and illuminating oils are separated from petroleum by distillation, and paraffin is separated from the residue left after distilling by refrigeration and pressure.

Insoluble substances are separated from liquids by filtration or precipitation, soluble principles and extractive matter from drugs by percolation. Oils, ethers and some other substances separate from water or aqueous solutions with which they may be mixed by stratification, the lighter substances floating to the top; in this manner, essential oils when distilled are separated from the distillate, and ether, which is used to wash aqueous solutions of opium in making deodorized tincture of opium, is separated from the purified solution. Chemical salts in solution may be separated from each other and recombined into different salts by mixing their solutions. In this process precipitation, which is the separation or subsidence of an insoluble salt formed by the combination, frequently occurs, and the precipitate may be separated by pouring off the supernatant fluid. Separation

tion often occurs in substances by change of temperature,—in a few by heat, but more usually by cold. Crystallization is a separation of chemical substances from solution; absorption is a means of separating substances. Evaporation separates lighter from heavier liquids; and so throughout the entire list of operations employed in pharmacy, separation in some way results.

SOLUTION.

Solution is the act or process of dissolving gases, fluids or solids by mixing them with other fluids or solids which combine with them to produce a homogeneous substance. The most common form of solutions are those in which a gas or vapor is dissolved in a liquid as ammonia gas, or carbon dioxide in water; or in which one liquid is dissolved in another, as an essential oil or ether in alcohol; or in which a soluble substance, as sugar or salt, is dissolved in water. But some solutions are made by the action of solids upon each other as, for example, when camphor and chloral hydrate or phenol are rubbed together, forming a liquid. Solutions may be called simple solutions, as when one substance dissolves in another without molecular change, or chemical solutions, as when substances combine with each other in chemical union and molecular change occurs; there is nothing, however, in the resulting solution to show whether the solution is simple or chemical except that the union of the substances may produce evolution of gas, heat or contraction of volume, or that the odor or color may be changed when the substances are mixed, showing chemical union or disassociation. The degree of temperature generally affects the solubility of substances, heat generally aiding solutions, while cold frequently precipitates or separates substances from their solutions. Some substances, however, are more soluble in a cold than in a warm solvent. The making of solutions of various kinds for various purposes is common in many of the industrial arts and in the manufacture of chemicals and pharmaceuticals, the

chemist must have most of the substances which he combines in the form of solutions. In pharmacy many solutions are official and much of the medicine dispensed is in solution in some form.

In making solutions no special apparatus is required except such as is ordinarily at hand in an apothecary shop. Some means of heating is frequently required to facilitate solution. Some substances are best reduced to powder before dissolving, while others dissolve best if left in crystalline form. Scale salts are best dissolved as they are, by gentle agitation in a shallow vessel so that they will not mass together; heat is frequently applied—the water-bath being generally useful—but naked fire, stove or steam heat is often used. Solution is supposed to be caused by some form of molecular attraction, but this is not well understood. There are simple solvents which dissolve soluble substances without chemical change, and, when the solution is evaporated again to a solid, yield the same substance that was dissolved, no molecular change having occurred. There are also other chemical solvents in which the substances dissolved are transformed by chemical union with the solvent, and which, when evaporated, yield solids differing from either the solvent or the substance dissolved.

A *saturated* solution is one in which the solvent has dissolved or taken up all the soluble substance which it is capable of holding at the temperature at which the solution occurs. A saturated solution is generally considered to be at the ordinary room temperature; if a lower temperature occurs it deposits a part of its soluble constituent, while at a higher temperature it would take up more. Thus it will be seen why some solutions appear cloudy in cold weather and bright when the temperature is increased.

A *supersaturated* solution is one that contains more of the soluble substance in solution than will remain in solution at normal temperature; or it may be a clear solution if at rest, but if disturbed will precipitate a portion of the soluble substance.

ORGANIC MATERIA MEDICA

Materia Medica is that branch of medical science that relates to substances employed as medicines, and Organic Materia Medica relates to vegetable and animal substances used as medicine; their sources, properties, modes of preparation and administration, and their effects.

In this section plant and animal substances used as medicine are briefly considered; with such information relative to their habitat, manner of growth, parts used, medicinal properties and action, forms of preparation, and dosage, as may be of general interest to physicians and pharmacists.

Only a small number of the plants known to botanists are recognized in the Materia Medica; and it is probable that in the future this number will be greatly diminished. Many plants have been introduced into medicine that might well have been omitted and their places taken by the few that have been proven to be of value. A better knowledge of the few is more important than the uncertain knowledge of many. It is probably true that certain plants represent certain values as alteratives, astringents, diuretics, laxatives, cathartics, soporifics, eliminatives, depurants, diaphoretics, nutritives, reconstructives etc., and are possessed, in a general way, of properties similar to other plants of proven value that have been longer known in medicine; but it is the province of medical therapeutics to eliminate, as much as possible, those which are least efficient and study the properties and action of those which are fittest for the purposes desired. To do this, less attention must be paid to the heterogeneous collection of the Materia Medica and more concentrated upon such plants as have proven specifically valuable in medicine.

While we cannot ignore the claims made for many of the vegetable drugs used as medicine, we may, at least, select such as have shown superior virtues and trust future experience to develop the claims of others.

It is the tendency of houses that manufacture medicines for the trade to exploit new drugs and forms of medicine and to introduce them in various ways to the notice of physicians and their customers. While this, in a way, is progressive, it often compels the dealer to put in a quantity of the medicines that have been thus exploited, many of which remain on his hands as "dead stock" and are seldom, if ever, used. It is fortunate however, that manufacturers supply fluid extracts of most of the vegetable drugs in 4 ounce bottles, and druggists may provide themselves with a small quantity of each of the little-used drugs to complete their stock at a moderate expense.

To give the history, the habitat, the botanical description, the medicinal

and chemical properties and the medicinal uses of all the plants and animal substances which make up the Organic Materia Medica would require a large volume; and in this work only brief reference can be made to what is most important for the busy druggist or physician to know or refer to, for present information that he may desire.

For the better understanding of the classification and nomenclature of plants the following brief article on Botany is appended:

BOTANY

EARLY HISTORY OF BOTANY.

Although Theophrastus had written a *Historia Plantarum* about 320 B. C., the foundation of Botanical Science should be attributed to Aristotle about 347 B. C., as, in connection with his admirable works on Zoology, he at the same time outlined the science of Botany. They divided all plants into trees, shrubs and herbs, regardless of their characteristics. Dioscorides, a celebrated Greek physician and botanist who lived in the time of Nero, about 60 A. D., left a treatise on the *Materia Medica* in five books. He noticed about 600 plants, but his descriptions are so vague and superficial that the identity of the plants mentioned is chiefly a matter of conjecture.

After these writers came a long period of inactivity in Botanical research until, towards the close of the fifteenth century, several herbalists appeared who, following the precedent of the earlier writers, gradually introduced a system of similarity and grouping, which was the first concerted attempt towards a real botanical classification.

The early Herbalists of the sixteenth century from Brunfels in 1530, Fuchs, Bock, Mattioli and others to Kasper Bauhin, 1632, regarded plants chiefly as the vehicles of medicinal virtues; to them, plants were the ingredients in compound medicines and were therefore termed "*Simplicia*," simple constituents of medicine. Nevertheless, their descriptions and investigations led up to a system of botanical classification from which has emerged the science of Botany of the present day.

CLASSIFICATION IN BOTANY.

In Botany no system of classification was attempted until the sixteenth century, (1583) when Andrew Cæsalpinus, of Florence, It., published his work "*De Plantis*," in which he arranged about fifteen hundred plants into 15 classes, characterized chiefly by difference in fruitage. John Ray, of Essex, England, made the first step toward a natural classification of plants in his "*Methodus Plantarum*," published in 1682. Several other authors during the following century improved upon the systems then in vogue, but no great advance was made until Linné (Linnaeus), the Swedish naturalist, established the artificial system bearing his name, which was promulgated in his "*Philosophia Botanica*" (1751) and "*Species Plantarum*" (1752). This system consisted of twenty-four classes, and a variable number of orders, and was founded as to classes, mainly upon the number and the dispositions of the stamens, and, as to orders, partly upon the number of styles and stigmas. Because of these distinguishing features this is frequently called the "*Sexual System*." An author, writing on the work of Linnaeus, says: "Among the most important work which he rendered to Science, not the least was the introduction of a more clear and precise nomenclature." This in fact, is what still survives of the work of Linnaeus; for although his name

is the most prominent among botanists of all ages, his system of classification was soon superseded by the "Natural System" which was introduced by Antoine Laurent de Jussieu, of the Jardin des Plantes, Paris, and published in his work "*Genera Plantarum*" (1789). The system of classification which he introduced was somewhat modified by DeCandolle, and since his time his work has been variously modified by eminent botanists, as Lindley, Hooker, Bentham and others. In this country, Wood, Gray, and Maisch have published text books and have contributed largely to the science of systematic botany.

Artificial System.

The Artificial System formulated by Linnæus, although a great improvement on the heterogeneous systems then in vogue, totally failed to show the true relationship and affinities of plants, by which they are naturally united and classed. This system, however, continued in use more than a century, until Jussieu introduced the Natural System, which has since, with some modifications, been universally adopted.

Natural System.

The Natural system, which is now universally used, is very simple. Plants—which comprise all manner of vegetable growth, from lichens to the largest trees—are divided into two series or sub-kingdoms:

Both series of plants are divided into a considerable number of orders and a great number of families and varieties which cannot be considered in the limits of this article.

SERIES I. Phænogamous or Flowering Plants. Including all manner of proper flowering plants, or those which fructify by means of stamens and pistils and produce true seeds. Plants producing real flowers and seeds.

These are divided into two classes:

Class I. Exogens or Outside Growers. *Dicotyledonous Plants*, distinguished by having wood or woody matter growing in a circle between the pith and bark, and showing, in perennial plants, yearly layers of growth. These plants have net-veined leaves, and the parts of the flowers mostly in fours or fives and have two cotyledons or fleshy seed-lobes usually enclosing the germ from which the plant is produced. This class is divided into two sub-classes:

1. **Angiospermous Plants**, having a pistil or pistils, and ovules enclosed in an ovary. This sub-class consists of (1) Polypetalous, (2) Monopetalous or Gamopetalous and (3) Apetalous plants.

2. **Gymnospermous Plants**, without a proper pistil and with naked ovules on a scale or on the end of a short axis. (The *Coniferæ*).

Class II. Endogens or Inside Growers. *Monocotyledonous Plants*, distinguished by having scattered internal woody structure in bundles or net-work, instead of layers, parallel-veined leaves, and parts of the flowers very generally in threes; with seeds having only one cotyledon or seed-leaf, generally enclosing the germ from which the plant is produced. This class is divided into (1) Spadiceous, (2) Petaloideous, and (3) Glumaceous plants.

SERIES II. Cryptogamous or Flowerless Plants. Including all those which fructify without true flowers, producing spores in place of seeds.

These are divided into two classes, as follows:

Class III. Acrogenous Plants or Acrogens. These are Cryptogamous plants with a distinct axis or stem growing from the apex, usually with distinct leaves. They are divided into two sub-classes.

1. **Vascular Acrogens or Pteridophytes.** Plants having stems containing both woody fiber and vessels and having sexual organs formed on a minute prothallus which is developed from the spore on germination. This sub-class includes the Horsetail rushes, the ferns, the club mosses and a few other orders.

2. **Cellular Acrogens or Bryophytes.** Plants having cellular tissue only, with sexual organs borne upon the plant itself. This sub-order includes the Hepaticæ or liverworts, and the scale-mosses (Jungermanniaceæ).

Class IV. Thallogenous Plants or Thallogens, consisting of lichens, fungi and algæ.

Besides this general division of plants into **SERIES** and **Classes** corresponding to their very prominent characteristics they are also divided into **Orders** or **Families** in which are grouped such as have similar general resemblances, that is such as have a relationship to each other in a general way, as the Compositæ (Composite Family), the Labiata (Mint Family), the Liliaceæ (Lily Family) etc. The term "Order" was formerly applied to this classification, then it was changed in the U. S. P. to "Natural Order," and now in the 8th Revision it is changed to "Family," conforming with recent botanical authorities.

The Orders are subdivided into **Genera** in which are grouped the species which closely correspond in certain forms and features which go to make up the genus, as distinguished from some other genus of the same order or family.

Species are the kinds of plants that are grouped into a genus, and which may differ somewhat from each other but must all conform to the general characteristics of the genus.

In pharmacy the name of the plant or part of the plant is first given either in Latin or English or other language, as "**Anisum.** Anise." "The ripe fruit of *Pimpinella Anisum*" (the species) "Linné" (the authority) "(Fam. Umbellifera)" (the family or order).

The part of the plant used is generally designated in the description, as the flowers, the leaves, the bark, the root-bark, the fruit, the seeds etc.

In botanical classification the species is taken as the unit and the genus is built up from the several species, the same as a structure would be built up from A B C blocks, alike in most particulars but with distinguishing marks by which each one would be known from the others. The genus, made up of species, is grouped with other genera, having similar characteristics, into a Family or Order, corresponding generally with the parts of which it is composed.

A genus may be represented by a single known species or by many, but all the species of a genus must conform to the type in every important particular. It is not, however, the province of pharmacy to go into details of botanical structures, but to designate the medicinal properties and uses of drugs and devise such preparations as will be best suited to the purposes for which they are required.

Nomenclature.

The names of plants have been variously derived from the shape of their leaves, flowers, fruit, seeds or roots; as hepatica, (liver leaf); larkspur, shepherd's purse, fox glove, dandelion (dent de lion), trumpet vine, colt's foot, etc., or from their odors or medicinal properties, or the names of gods or goddesses or of distinguished personages or the names of botanists, or of others who have discovered or described them or the locality in which they are found. The Latin names sometimes, but not necessarily, correspond with the common names.

References.

Reference is made in many text-books to botanical authorities who have described and classified plants. In some, as in the U. S. P., the name or names are given in full, at Linné, Bennett, DeCandolle, etc.; while in others, as in the Br. P., the names are abbreviated, as Linn., Mill. (Miller), DC. for DeCandolle, etc.

VEGETABLE DRUGS.

By far the greater part of substances used in medicine are of vegetable origin. Nearly every plant that exists has at one time or another played its part in the history of pharmacy, and newly discovered ones with "wonderful virtues," are still being brought to light from "lands beyond the sea."

But little attention is now given by pharmacists to gathering and curing drugs; that branch of the business, which was in former time an important part of the trade of the apothecary, being given over to collectors and others who have better facilities for carrying it on.

Vegetable substances are, or should be, gathered at the time when they contain the greatest amount of medicinal value, and are prepared for market in various ways, which depend largely upon the intelligence, experience and convenience of the collectors.

A brief commercial classification of vegetable drugs, and the methods employed for preparing them for the market may not be superfluous.

Balsams.—Many substances of quite different consistence and composition are classed as balsams. They are generally obtained by puncturing pustular cells in the bark, or by making cuts or incisions in the bark or wood of certain trees or plants. They are liquid, semi-solid or solid and are classified quite differently in commerce and pharmacy—for example Canada Balsam or Balsam of Fir, commercially, is a liquid and is known in pharmacy as Canada Turpentine. Balsam Peru is a true balsam and is known as such both commercially and in pharmacy. Storax is a true balsam, having a semi-solid consistence, but it is not known as a balsam either commercially or in pharmacy. Balsam of Tolu is a solid or nearly solid balsam and is known by that name commercially and in pharmacy. Balsam Copaiba, which is a liquid oleo-resin, is known in pharmacy simply as copaiba, while a variety derived from the East Indies is known as wood oil or Gurjun balsam.

Barks.—Barks are gathered in the early spring just after the sap has started to flow. The bark may then be readily stripped from the branches, trunk or root, and it contains as

much or more medicinal value than as at any other season. The bark from twigs or small branches is easiest removed by heating them over a fire and then pounding them with a billet of wood. The trunk-bark of trees is generally removed in slabs or strips, the outer portion being shaved or hewed off and discarded, the inner bark only being used; the root-bark has usually to be shaved off. Barks are dried in the open air or by moderate heat in kilns, evaporators, or other heating apparatus, and come into the market in the form of quills, small slabs, strips, or broken into small pieces. They are then cut, crushed, ground, or powdered as desired for sale or use.

Beans.—Under this commercial name several kinds of vegetable seeds or pods are supplied. The common bean grows several in a pod, and is too well known to require further description. Tonka beans are the fruit of a large tree, a single seed. The Calabar bean is obtained from a climbing plant, two or three of them growing in a pod. The St. Ignatius bean grows on a tree, in a fruit resembling a pear, which contains about twenty of the beans (seeds) embedded in a dry, medullary matter. The

Vanilla bean is a fleshy pod enclosing a great number of very small seeds.

Berries.—Under the common name of berries are included many of the smaller fruits, like strawberry, raspberry etc.; the small fleshy fruits, like juniper, ash and laurel, and the dry, unripe berries, like cubeb, spice and pepper. The juices of some berries are used, while others are gathered and dried by suitable heating apparatus, to prepare them for the market.

Buds.—A few kinds of leaf-buds, like Balm of Gilead, are gathered, dried, and used in medicine; but the term is usually used in pharmacy to designate undeveloped flower-buds, of which cloves and cassia-buds are examples. They are gathered in their proper season, and dried in the open air for the market.

Capsules.—The seed vessels, made up of more than one carpel or division holding the seeds, as the cardamom capsule or the poppy capsule. Capsules are gathered when the seeds are nearly ripe, and dried without artificial heat. In some plants the seeds, only, are used in medicine, but the capsules containing the seeds are found in commerce. In others the capsule, only, is used as medicine.

Flowers.—Flowers should be gathered in their early blossoming before they have passed into their prime; many, even, are best gathered when the buds are opening. They are usually gathered with as little of the stalk as possible, except in the case of plants and herbs, which are gathered entire at the season of flowering. Flowers should be dried with as little exposure as possible, and packed away in a dry cool place.

Summit Flowers.—The flowers which grow in clusters, corymbs, or other forms at the top of small plants are known as summit flowers in foreign pharmacy, but are designated in the U. S. and Br. pharmacopœias as the flowering tops. They sometimes include leaves and small stems.

Fruit.—Fruit is the botanical name for all kinds of vegetable-growth enclosing and including seeds; but different kinds of fruit are classed and named according to their peculiarities; as fleshy fruits, of which apples and berries are examples, and dry fruits, which include nuts, capsular and

other dry fruits, seeds, etc. Fruits are generally gathered when the seeds are ripe, and are dried, preserved, or otherwise treated according to their nature and use. Fleshy and stone fruits should be dried in an evaporator or other suitable drying apparatus, while the dry fruits are either sufficiently dry when ripe or may be dried in the open air. Many of the fruits are classed commercially as berries, nuts, seeds, capsules, etc.

Gums and Gum-Resins.—Among the natural vegetable substances which are collected and put upon the market, a certain class of gums and gum-resins may be included. They are exudations from plants, either from the stings of insects, or from incisions made for the purpose of collecting the gum or gum-resin. The collection of gums and their preparation for the market forms a very large and important industry.

Besides the gums and gum-resins, there are many substances known commercially as gums which are of an entirely different character—as opium, which is a concreted juice, and catechu, which is properly an extract.

Herbs.—In pharmacy herbs are understood to be the upper portion of small plants including the leaves, flowers and small stalks, — the larger roots and stalks being discarded. Commercially the smaller plants, which are gathered entire, are also classed with herbs. Herbs should generally be gathered when in bloom, carefully dried without artificial heat, and packed away in a cool, dry place.

Leaves.—Leaves should be gathered when the plants or trees are at their fullest prime. With plants, this is generally a little before the flowering season; and with trees and shrubs, usually a little before the ripening of the fruit. Leaves should be dried without artificial heat and packed away in a cool, dry place.

Nuts.—As generally understood, nuts are seeds of plants enclosed in a shell or cover. Most nuts also have an outer covering, fleshy or fibrous, from which they are freed before preparing them for the market. They are gathered when ripe and dried.

Plants.—Plants, as the term is understood botanically, include all vegetable-growths, great or small; but in

pharmacy the name is generally applied to small plants that are gathered and used entire. They should be gathered about the season of flowering and dried without artificial heat.

Roots.—Commercially considered, roots are the parts of plants which grow in the ground; in pharmacy, however, they are divided into several classes according to their nature—as root, rhizome, rootlets, bulb, cormus, tuber, etc., the latter not being properly classed as roots. Roots should generally be gathered after the leaves are off the plants in the fall, or before they start in the spring. The bark, only, of many woody roots is used, while some are gathered entire, being cut, sliced, crushed or otherwise prepared for market. The rhizome is the main portion of the root or root-stick, to which the rootlets, if any, are attached. Of the roots which consist of rhizome and rootlets, some are used entire, while others, only rhizome or rootlets may be used.

The bulb, cormus and tuber are classed with roots commercially, but are botanically dissimilar. Bulbs are usually sliced or dried; cormus and tuber may be sliced or dried whole.

Seeds.—Many of the so called "seeds," as caraway, cardamom, coriander, fennel, etc., are classed in pharmacy as fruit. The botanical distinction being, that when two or more separate seeds are enclosed by a pericarp or envelope, the structure

is called fruit, while the seed itself is a single ovule, containing the embryo and its nutriment. Seeds are generally gathered when ripe and dried, if necessary, by natural heat, some of the fruits which are commercially classed as seeds require artificial heat.

Twigs.—The tops of the branches of some shrubs and small trees are clipped off and known as twigs. Dulcamara and witch hazel twigs are examples.

Woods.—The greater part of the woods used in the drug business are employed as dyes. A few, however, as guaiac and quassia are used as medicine. They are generally found in the market in chips or shavings, or ground to the proper fineness for use.

Pharmaceutical and Chemical Products.

The many products which are derived from vegetable substances may conveniently be classed as pharmaceutical and chemical. In the former class may be included such as are generally prepared by pharmacists in their business, and in the latter, such as are usually prepared by the larger manufacturing chemists. Of the former class, fluidextracts, solid extracts, tinctures, spirits, syrups, etc., and of the latter, the alkaloids and their salts, vegetable acids, alcohol and distilled spirits, etc., may be mentioned.

ANIMAL DRUGS.

But few animal substances, comparatively, are used in medicine, yet in the aggregate the drugs derived from the animal kingdom form quite a percentage of the material employed as drugs.

In the early days of medicine, animal substances were used to a great extent—the most ridiculous and foolish use being made of them—but, as the science of medicine has emerged from its early superstitions, many of them have been dropped and now, only such as are of known value are retained. There have recently come into use, however, a number of animal preparations which have been proven efficient, and are now considerably used as medicine. They are noted in the following pages.

Albumen. Chiefly from eggs of the domestic fowl, *Gallus Bankiva*; also from the blood of animals.

Adeps. Lard. From the internal fat of the abdomen of the hog, *sus scrofa*.

Adeps Lanæ. Wool-fat. From the wool of sheep, *Ovis aries*.

Ambergris. A wax-like concretion formed in the intestines of the sperm whale.

Apis. The Honey Bee. These insects produce honey and beeswax. A tincture is sometimes made by macerating the bodies of the insects in alcohol.

Cantharides. Spanish Flies. Used in the form of powder or extract as a vesicant or counter-irritant.

Coccus. The female cochineal insect gathered from a species of cactus, and used chiefly for dyeing or coloring.

Castoreum. Castor. A secretion from the preputial glands of the beaver. The dried preputial follicles of the beaver, containing the preputial secretion.

Cera. Wax. From the honeycomb of the bee, *Apis mellifica*.

Cetaceum. *Spermaceti*. The concrete fatty substance obtained from the head of the sperm whale, *Physeter macrocephalus*.

Cornu Cervi. Deer's horn. This is prepared in various ways for medicinal use.

Fel Bovis. Oxgall. The bile obtained from the gall-bladder of the ox, *Bos taurus*.

Gelatinum. Gelatin. Obtained from the skin tissue, ligaments and bones of animals by boiling them in water.

Glandulæ. Glands. Several glands obtained from animals are employed in medicine; either in the form of powder from the dried glands or extracts, alkaloids or principles prepared from them. See *Glandulæ Suprarenalis*, *Glandulæ Thyroidæ* etc.

Glycerinum. Glycerin. A constituent of animal fats obtained by physical or chemical decomposition.

Hirudo. The Leech. An aquatic blood-sucking worm, that may be applied to bruises to remove extravasated blood.

Ichthyocolla. Isinglass. The swimming bladders of several species of fish. The Russian isinglass, from

Acipenser Huso, a species of sturgeon, is the most valuable. American isinglass from *Gadus merluccius* is most common.

Lac. Milk. The secretion from the mammary glands of female mammals. The varieties used as medicine and food are from several species of *Ruminantia*; the ass, the cow, the goat, the mare, and the sheep. The chief constituents of milk are butterfat, casein and milk sugar.

Lapis. Crab's Eye. Excretions in the intestines of the crawfish.

Lymph. A colorless, transparent animal fluid, found in the various tissues and organs of the body, in which certain virus cultures may be propagated.

Musk. A secretion found in the musk-bag of the male musk deer, *Moschus moschiferus*.

Olea Animale. Animal Oils. Many kinds of fixed oils are obtained from animals, birds, fishes and reptiles. They are described under their appropriate titles.

Ossæ. Bones. Bones are obtained from all kinds of animals, birds, fishes and reptiles. From bones are prepared animal charcoal, or bone-black, phosphorus, bone-oil etc.

Pancreas. From the pancreatic glands pancreatin, which emulsifies fat, is obtained.

Pepsin. From the mucous membrane of the stomach, pepsin, which digests various albuminous foods, is obtained.

Serums. An animal fluid found in the blood, in milk, and other fluids containing albumin. Blood serum is used as a culture medium for various antitoxins introduced into the circulation of animals. See *Serum Antidiphthericum* etc.

Sevum. Various kinds of suet or tallow are included under this heading. The natural abdominal adipose fat of animals, separated from membranous tissue by rendering.

Testa. The shells of oysters or clams, which may be prepared for use by burning and pulverizing.

The fats and oils obtained from animal tissues constitute the greater portion of animal-matter used in pharmacy as medicine. The bones of animals are used in making phosphorus, the phosphates and animal charcoal

or bone-black. Horns, hoofs, blood, etc., are now employed in making ammonia and cyanogen products, and scraps of skin in making gelatin. Some expensive animal substances, such as musk and ambergris are used quite extensively in perfumery. Pepsin, pancreatin, albumen, the meat extracts, etc., are used internally. Cantharides is mostly used externally, and many other animal substances have various uses in medicine and pharmacy.

Pharmaceutical and Chemical Products.

The pharmaceutical products prepared from animal substances are mainly the cerates, ointments and plasters, in which animal fats are used as bases. Several tinctures also are prepared from animal substances, such as cantharides, castor, musk etc. The chemical products consist mostly of a few alkaloids and their salts, and may include pepsin, pancreatin, etc., as they are not usually prepared except by manufacturing establishments.

Besides the foregoing, a class of preparations derived from animal organs have recently been introduced as medicinal agents, some of them having met with a favorable reception.

Most of these substances are used in the form of powder or precipitates prepared from their solutions, or by drying the substances previously cut fine, or minced, and by reducing the dried product to a powder. Some of them are also furnished in a liquid form or extract. *Liquor Thyroidei* being official in the Br. P., 1898.

Suprarenal extract has also been highly recommended and is now considerably used by the medical practitioners. Brain extract, spinal cord extract, spleen extract, pituitary-body extract, thymus extract, kidney extract, bone marrow extract, and orchitic extract (from testicles) have also been prepared, but are little used. It is possible that in the future some of them may meet with favor from the medical profession on the principle that "a part strengthens a part."

ORGANIC MATERIA MEDICA.

The following pages give brief description of most of the crude organic substances employed in medicine, together with their important alkaloids and compounds generally known and recognized in pharmacy and medicine. For further special preparations, assays and comments see Part II.

ABIES. Fir. Spruce.

A genus of Conifers comprising species of Fir and Spruce (Fam. Coniferae). The trees are evergreen and of the same family as pines, with which they were formerly classed by some botanical authors; but they differ from them sufficiently in fruit and foliage to be separately classified. The name "Fir" was given originally by our Scandinavian forefathers to the Scotch pine, (*Pinus Sylvestris*), and it is at present not infrequently employed as a general name for all of the true conifers (*Abietinae*), but the name in a more concise sense has been referred to the spruce and silver firs—the genera *Abies* and *Picea* of the modern botanists. The species are divided by botanists into Fir and Spruce; Linnæus used the name *Abies* to designate the Spruce and *Picea* to designate the Firs, and some of the late writers follow this designation, but the ancients employed the terms just reversed and some of the later botanists follow them; this makes some confusion in the botanical classification, but it is only technical, and in this work the generic name *Abies* will be used for all the species mentioned.

Abies Balsamea. Fir Balsam. Silver Fir. Balm of Gilead Tree. (*Pinus Balsamea*).—Canada and northern U. S.

The chief commercial product of this tree is Fir Balsam or Canada Balsam, known in pharmacy as *Terebinthina Canadensis* or Canada Turpentine (which see). In the arts this is extensively used in making printing inks and in some kinds of varnish; it is also employed in mounting microscopic objects and binocular glasses. In pharmacy it is an ingredient of balsams, balms, ointments, sticking salves, plasters etc. An oil of fir is distilled from the balsam, but is seldom used medicinally. From the cones, leaves and small branches of the tree an "Oil of Fir" is distilled by the steam process and is somewhat used in liniments and embrocations.

Abies Canadensis. Hemlock. Hemlock Spruce. (*Pinus Canadensis*).—Canada and northern U. S.

From the leaves and small branches of this tree "Oil of Hemlock," which is the chief pharmaceutical product, is distilled by the steam process (see *Oleum Abies Canadensis*.) From the old trees or those which are about to decay a juice exudes which concretes by exposure to the atmosphere and forms a gum or pitch known as "Hemlock Gum" or *Pix Canadensis* (which see). The inner bark, in the form of powder is an ingredient of the old Thompsonian Composition Powder, formerly much used as a diaphoretic. A fluid extract is prepared from the inner bark and a proprietary remedy known as "*Pinus Canadensis*," both in dark and light color, it said to be made from the inner bark. In the industrial arts hemlock bark is much used for tanning leather.

Abies Excelsa. **Abies Communis.** Norway Spruce. Spruce Fir.—Northern Asia and Europe; Southern Europe, mountainous districts.

This tree is the principal source of the Burgundy Pitch of commerce, known in pharmacy as *Pix Burgundica*, (which see). This is prepared from the sap or juice which concretes when portions of the bark are removed or when incisions are made in the bark. The concretion or pitch forms in flakes. This is boiled in water, strained and collected from the surface, making "Burgundy Pitch," used in sticking salves, plasters and ointments. It is also the chief ingredient in cheaper grades of sealing wax and grafting wax, and was formerly much used as chewing gum.

Danzig-spruce is made by boiling the cones or buds of the Norway spruce in water, adding sugar and yeast and allowing the liquid to ferment. It is a popular native drink.

Abies Menziesii. Menzies' Spruce. Balsam Pine.—Oregon and northern Pacific states. From this variety Oregon Fir Balsam is obtained. This is extensively used for making printing inks because it is cheaper than Canada fir balsam; it is also used in making some kinds of varnish and, sometimes, as a substitute for fir balsams in ointments and plasters, although it is inferior to it, but has a heavier body, greater consistency and solidifies much more readily.

Abies Nigra. Black Spruce. Double Spruce.—Northern New York, New England, Nova Scotia and Canada.

This tree is the source of Spruce Gum which exudes from the trunk and is gathered in pieces the size of chestnuts or a little larger. It was formerly much esteemed as a chewing gum and was in much demand before the introduction of Checle for that purpose. An extract or "Essence of Spruce" may be prepared from the young branches, by boiling them in water, which can be used for making Spruce Beer. "Oil of Spruce" is distilled from the leaves and small branches by the steam process. It consists chiefly of terpene.

Abies Alba, the White Spruce, is extensively used for making paper pulp by the "sulphite" process.

Abies Picea, Abies Pectinata. European Silver Fir (*Pinus Picea*).—Switzerland and Germany, mountains.

This variety produces Strasburg Turpentine, which resembles Canada Turpentine and is used for similar purposes chiefly in Europe. An oil is distilled from the cones of this variety which is known as "Essence de Templine."

The foregoing are all the varieties of *Abies* which furnish products used to any extent in medicine, but several other varieties yield similar products which are somewhat employed. A. Frazeri of the southern U. S.

yields a balsam similar to Canada Turpentine; *A. Douglasii*, of the Rocky Mountains yields a balsam similar to Oregon Balsam etc.

ABRUS PRECATORIUS. Jequrity.

The roots and seeds or beans of *Abrus Precatorius* (Fam. Leguminosæ).

The seeds or beans, which are the medicinal part, are used in India as a standard weight, and, when properly prepared, as a poison for criminals. They contain an active irritant ferment which, when applied to the eye produces artificial conjunctivitis. They are usually brilliant scarlet in color with a black spot at one end, roundish or oval, about $\frac{1}{4}$ inch long. From their shape and shiny appearance they are used for necklaces or rosaries (prayer-beads) from which their Latin name is derived.

Infusion of Jequrity may be prepared by pouring half an ounce of hot water on three beans, crushed or powdered, and, after standing a few hours, pouring off the liquid and adding enough hot water to make one ounce when the two liquids are filtered. The infusions should be freshly prepared when wanted for use.

Decoction of the seeds known in some parts of Europe as "Jaqueriti" produces a purulent inflammation of the healthy conjunctiva, and it is precisely this counter-irritant effect which makes it useful in chronic granular conjunctivitis.

Abric Acid— $C_{12}H_{24}N_2O$ —has also been found in jequrity but has not, as yet, been employed medicinally.

Abrin, (also written Abrine). A proteid obtained from the seeds of *Abrus precatorius* by precipitating a concentrated aqueous extract with alum. It is a brownish-yellow powder, soluble in water or solution of sodium chloride. It is believed to consist of two proteids, paraglobulin and α -phytalbumose, which closely resemble snake venom in their action and properties, except that in snake venom these properties are rendered inert by a temperature somewhat below that of boiling water. Abrin is a remarkably potent poison, $\frac{1}{100}$ of a grain being a fatal dose for an adult. Great care must be used in handling it. Its uses in solution are similar to fluid jequrity. 1:500,000 is used instead of infusion of jequrity.

Jequritin. The inorganic ferment obtained by the maceration of jequrity seeds in water, and which produces inflammation of healthy conjunctiva, has been discovered by Bruylans and Venneman and named "Jequritin." It is the same as "Abrin," except that Abrin is the isolated principle. It is employed in solution 1:500,000.

Jequritrol. This is the trade name of a standardized, sterilized preparation of jequrity seeds introduced by Prof. Roemer for use in place of jequrity infusion. It contains 50 percent. of glycerin, which acts as a preservative. It is furnished in four grades of strength, numbered 1, 2, 3, 4.

Jequritrol Serum. This is an antitoxin intended to arrest the action of jequritrol, and is used only for this purpose. It is prepared in accordance with the principles formulated by Behring.

ABSINTHUM. Wormwood.

The leaves and the flowering tops of common wormwood, *Artemisia Absinthium*; Linné (Fam. Compositæ); obtained in the northern hemisphere, chiefly cultivated.

It was formerly official in the U. S., but was dismissed from the 8th revision. It is now official in all pharmacopœias except the Br., Jap. and U. S.

The leaves and flowering tops designated "*Herba Absinthii*," are generally official and should be used unless otherwise specified, when absinthium or wormwood are directed.

Absinthium is an aromatic, bitter, tonic, stomachic, anthelmintic; also used externally for fomentations etc. An important ingredient in the spirituous liquor Absinth, and the vinous liquor Vermouth and other cordials.

Absinthium Ponticum. Roman Wormwood. The leaves and flowering tops of *Artemisia pontica*, Linné (Fam. Compositæ). Middle Europe. Smaller,

but having a stronger and more agreeable odor than common wormwood. Its properties and uses are similar and it is considerably employed in Europe in making absinth, compound bitters and cordials.

Absinth. An aromatic spirit or liquor much used as a beverage. It derives its name from Absinthie, Fr., one of the ingredients of which it is composed.

Absinthic Acid. Considered identical with succinic acid; not employed in medicine.

Absinthin (Absinthine, Fr., Absintina, Mex.)— $C_{40}H_{56}O_8 + H_2O$.—The bitter principle of wormwood. It may be obtained as a yellowish powder by precipitating a hot infusion of the plant with tannin, washing the precipitate with a little cold water, dissolving it in alcohol, mixing the solution with lead oxide, drying it by evaporation, treating the dry residue with alcohol, filtering through animal charcoal and evaporating the filtered liquid by water-bath to dryness. If white crystals are required (Duquesnal), dissolve the foregoing with ether, filter again through animal charcoal and allow to evaporate spontaneously and crystallize from the ethereal solution.

Absinthin is useful in doses of 0.10-0.20 gm. ($1\frac{1}{2}$ to 3 grains) at each meal as a digestive tonic. In larger doses it is a narcotic poison, increasing the action of the heart and causing tremor and eliptiform convulsions.

Absinthol— $C_{10}H_{16}O$.—The chief constituent and essential of wormwood oil; isomeric with camphor. It is associated in wormwood oil with about 2% of terpenes and a small proportion of blue oils.

Sal Absinthii—Salt of Wormwood (Sel d'absinthe, Absinthate de Potass, Fr.).—This salt, which was official in the old pharmacopœias, is prepared by leaching the ashes of wormwood and evaporating the lye to a dry powder, in the same manner as employed for making crude potash from wood ashes. It consists mainly of impure potassium carbonate and when directed, potassium carbonate may be used.

ACACIA. U. S. Acacia. Gum Arabic.

Acaciæ Gummi. Br. Gum Acacia.

"A gummy exudation from Acacia Senegal, Willdenow; and other species of Acacia (Fam. Leguminosæ)." <U. S.

"A gummy exudation from the stem and branches of Acacia Senegal Willd.; and of other species of Acacia." <Br.

The acacias which produce gum are all thorny or prickly trees or shrubs growing on dry, sandy soil. The gum gathers beneath the bark through the fissures in which it exudes and hardens on exposure to the atmosphere. It is gathered by natives and taken to various shipping ports from which varieties derive their names, as Turkey gum, Barbary gum, Senegal gum, India gum; or names of ports in those countries from whence it is shipped. When it arrives at the distributing market it is "sorted" according to the size and color of the lumps and is known as select, 1st, 2nd, 3d etc., and "sorts."

Gum Arabic may be had in the market as above described or in granulated or powdered form. The granulated is more readily soluble than either the lumps or powder and is, therefore, more convenient for preparing mucilage or syrup, while the finely powdered gum is best for making emulsions, and as an ingredient in pills, powders, confections, troches, mixtures etc.

The true acacia gum, mentioned in ancient pharmacy as Turkish gum or Gum Gedda, is now replaced by Gum Senegal.

Acacia dissolves slowly in about twice its weight of water, but is insoluble in alcohol, ether or benzene.

The only official preparations of acacia are Mucilago Acaciæ and Syrupus Acaciæ, but it is employed in many other preparations as noted above. It is given medicinally as a demulcent ad. lib.

Arabin (Arabic Acid). When gum arabic is dissolved in water, and is then acidulated with hydrochloric acid, a precipitate forms called arabin. This is an acid-calcium salt, also containing magnesium and potassium arabates, it gives a brown coloration in presence of hydrogen peroxide.

Arabic acid swells in water, when pure, but does not dissolve until an

alkali is added. It is converted into sugar and galactose on boiling with dilute acids.

Arabinose (Arabin Sugar). This is the same nature as glucose prepared from starch and is produced by boiling gum arabic for a long time in diluted sulphuric acid.

ACACIA CORTEX. *Acacia* Bark. *Babul* Bark.

The bark of *Acacia Arabica*, Willd. (Fam. Leguminosæ); or of *A. decurrens*, collected from wild or cultivated trees not less than seven years old, then dried and kept for at least a year before use.

Acacia bark is official in the Ind. and Col. Addendum. Its uses are similar to oak bark. It is usually administered in the form of decoction 1:16, as an astringent. The bark contains a large percentage of tannin—as high as 22 percent.

ACALYPHA. *Acalypha*.

An herb, "*Acalypha indica*," Linné (Fam. Euphorbiacæ), indigenous to the hotter parts of India. It is official in the Ind. and Col. Addendum, and has properties similar to senega. The chief preparations of the drug are "*Succus Scoparii*" and "*Extractum Acalyphæ Liquidum*" (1 to 1), prepared in the same manner as the Liquid Extracts of the Br. P. with 90% alcohol. It has expectorant, emetic and laxative properties.

Acalyphine. An alkaloid obtained from *Acalypha*.

ACANTHEA. *Acanthea* Viridis. *Moyrapuama*.

A plant, native of South America, which is employed as a general excitant of the nervous system. A fluid extract representing the medicinal activity of the plant is prepared. The dose of the fluid extract is from 10 to 20 minims two or three times a day.

ACHILLEA. *Yarrow*, (Milfoil).

This plant was formerly official in the U. S., but has been dismissed. A fluid extract is prepared and an essential oil is distilled from the plant by steam.

It is an aromatic stimulant, having considerable reputation as a domestic remedy for female disorders, and for piles etc.

The following principles have been obtained from it:

Achilleic Acid, claimed to be identical with aconitic acid.

Achillein, the active principle of the plant. It is obtained as a brownish red mass, soluble in water and alcohol, and has a very bitter taste. Zannon gives its formula as $C_{26}N_{38}O_{16}$. The dose is $\frac{1}{2}$ to 1 gm. (8 to 15 grains).

ACONITUM. U. S., Br. *Aconite*.

"The dried tuberous root of *Aconitum Napellus*, Linné (Fam. Ranunculacæ), collected in autumn; yielding, when assayed by the process given, not less than 0.5 percent. of aconitine." <U. S.

"The root of *Aconitum Napellus*, Linn; collected in autumn from plants cultivated in Britain and dried." <Br.

In pharmacy the fresh leaves and flowering tops of the plant are used in several pharmacopœia preparations, and the dry leaves in others; also the root or tuber, which should be collected in winter or early spring before the leaves have appeared. The German aconite root is most commonly found in the market. Although several varieties of aconite have been official in the various pharmacopœias at various times, *Aconitum Napellus* is now generally used. The entire plant is acrid and poisonous and when administered in any form produces a tingling and numbness of the throat and muscles, with a reduced frequency and force of pulse and respiration.

The average dose of the powdered drug is 0.065 gm.=65 milligrammes (1 grain).

A fluid extract and tincture of aconite are official in the U. S. P., tincture and liniment of aconite in the Br. P., and the alkaloid aconitine in both.

Aconitine, $C_{34}H_{47}NO_{11}$, an alkaloid from aconite, is official in the U. S. P., the average dose of this alkaloid is 0.00015 gm.=0.15 milligrammes, $\frac{1}{400}$ grain.

ACTÆA.

A number of plants, bearing the botanical name **Actæa**, are used in medicine. They are generally known in pharmacy by other names as:

Actæa alba. White cohosh.

Actæa racemosa. Black cohosh, cimicifuga.

Actæa rubra. Red cohosh.

Actæa spicata. Baneberry, Christopher root. This is a European variety quite similar to the American cimicifuga or black cohosh. It is an active emetic and purgative; its medicinal properties being similar to the American white and red cohosh. Dose 5 to 20 grains.

ADANSONIA DIGITATA. Baobab.

The dried bark of a tropical African tree, naturalized in the West Indies..

This tree is of immense size, the bark is from the smaller limbs or twigs, and is tonic and stimulant, increasing the appetite. A fluid extract is prepared.

The fruit of this tree is known as "Monkey bread," or cream of tartar fruit. It is a pleasant, acid fruit having a slightly laxative action.

ADEPS. U. S., Br. Lard.

"The prepared internal fat of the abdomen of the hog (*Sus scrofa*, var. *domesticus*; Gray); purified by washing, melting and straining. It should be kept in well-closed vessels impervious to fat, and in a cool place." <U. S.

"The purified fat of the hog, *Sus scrofa*, Linn." <Br.

The title *Adeps Præparatus*, Prepared Lard, has formerly been official in the Br. P., but is changed in the last revision to *Adeps, Lard*.

The name lard is applied commercially to the rendered fat of the hog, but in pharmacy the term is intended to apply only to lard purified by washing with water, melting and straining. The process is described in Part II.

Adeps Benzoïnatus. U. S. **Adeps Benzoatus**. Br., come properly under the head of preparations, and will be found in Part II.

Adeps Lanæ and **Adeps Lanæ Hydrosus**, being more properly preparations, are included in Part II.

ADHATODA. Adhatoda.

The fresh dried leaves of *Adhatoda Vasica*, from a small tree growing in India. It is official in the Indian and Colonial Addendum, the chief preparation being *Succus Adhatodæ*, made from the bruised fresh leaves, and *Extractum Adhatodæ Liquidum* (1 to 1), and *Tinctura Adhatodæ* (1 to 8), made from the dried leaves. It seems to possess properties similar to tobacco.

Vasicine. This is an alkaloid prepared from *adhatoda*, and possessing its medicinal properties.

A fluid extract is prepared, dose 1 to 2 Cc. (15 to 30 minims).

ADIANTUM. Maiden Hair.

The fronds of *Adiantum pedatum*, of North America, or *Adiantum capillas veneris* of southern Europe; commonly known as maiden hair. Both varieties have a sweetly astringent bitter taste and are used in medicine as a mucilaginous expectorant and pectoral for coughs and catarrhs. A fluid extract is prepared: dose 1 to 2 Cc. (15 to 30 minims), also a syrup, 1:10, dose 4 to 8 Cc. (1 to 2 f℥drachms).

ADONIS VERNALIS.

This plant is found throughout the northern portions of Europe and Asia, where it has long been used as an abortifacient; and it has recently been introduced as a cardiac stimulant, being more prompt than *digitalis*, and without its cumulative effect. The whole herb is employed in medicine. It contains

a considerable percentage of aconitic acid, besides the following substances which are peculiar to it.

Adonite. A crystalline body to which this name has been given, has been extracted from *Adonis vernalis*. It is soluble in water, and has at first a sweetish taste, which rapidly disappears, leaving a dull sensation on the tongue. It crystallizes from water in very fine, long, transparent prisms, and from hot alcohol in short white needles. It is insoluble in ether and petroleum. It melts at $102^{\circ}\text{C}.$, contains no water of crystallization, and does not reduce Fehling's solution. It is optically inactive, and possesses the formula, $\text{C}_2\text{H}_{12}\text{O}_5$ or a multiple thereof.

Adonidin. A glucoside obtained from *Adonis vernalis*. Dose, $\frac{1}{8}$ to $\frac{1}{2}$ grain, every two hours. This is a cardiac remedy similar in its effects to digitalin and strophanthin.

Adonidin Tannate. A brownish-yellow powder, prepared by precipitating a solution of adonin with a solution of tannic acid.

A fluid extract of the herb is prepared with alcohol, dose 1 to 2 minims.

ADRENAL OR SUPRARENAL GLAND.

A number of preparations bearing names indicating the suprarenal gland as their source are found in the market. They are noticed under the title *Glandulæ Suprarenales Siccæ*, in Part II.

ADRUE. *Adrue Rhizoma.*

The rhizome of *Cyperus articulatus*, (Fam. Coniferæ). It is carminative and astringent; recommended for checking nausea of pregnancy or indigestion.

A fluid extract is prepared, dose 1 to 2 Cc. (15 to 30 minims).

ÆSCULUS HIPPOCASTANUM. Horse Chestnut.

The Horse Chestnut is a native of Asia, but is extensively cultivated as an ornamental tree in the U. S. The Ohio Buckeye—*Æsculus Glabra*, and the Red Buckeye—*Æsculus Pavia*, of the southern U. S., are similar.

The leaves, bark and fruit are used in medicine. An infusion of the leaves is employed for whooping cough, from the bark an extract and a fluid extract are made, an extract of the wood is also used for dyeing. A fixed oil is extracted from the seeds by pressure, and is said to be a valuable application for rheumatism or gouty enlargements of joints. The seeds or "nuts" are also carried in the pocket as a cure or preventative for rheumatism and piles.

Æsculin.—Esculin. A shining white crystalline glucoside obtained from the horse chestnut. *Æsculus Hippocastanum*. Its formula is given by Shiff as $\text{C}_{15}\text{H}_{26}\text{O}_9$. By treating it with sulphurous acid **Esculetin**, $\text{C}_8\text{H}_6\text{O}_4$, is obtained. Esculin is given for malaria in doses of 15 grains.

A fluid extract of the bark of *Æsculus glabra*, the Ohio Buckeye, is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

Asco Quinine. A combination of æsculin with quinine, recommended for neuralgia, sick-headache, rheumatism, etc. It is usually given in cachets of 1 to 3 grains, several times a day.

Argyrine. A trade name for an alkaloid obtained from horse chestnut. Used internally for hemorrhoids etc. Dose $\frac{1}{8}$ to $\frac{1}{4}$ grain.

AGARICUS ALBUS. White Agaric. *Boletus Laricis.*

This fungus is found on the old trunks of the European larch in Europe and on another variety of larch in Siberia. It is hoof-shaped, without a stalk, and as it is found on the market, is deprived of its outer rind, leaving a sponge-like interior which is used as medicine.

This substance, which was formerly much used under the name of white agaric and boletus, has again been revived as a purgative and bitter stomachic, and to control the night sweats of phthisis. It is used in making proprietary bitters, and sometimes prescribed in powder, or in the form of tincture.

Agaracin. This is an extract precipitated from an alcoholic tincture of agaric, the dose being 1 to 3 grains.

Agaracine or **Agaric Acid** is a white silky powder and is considered the most uniform and valuable of the preparations of agaric. It is also called **Laricic Acid**. It is slightly soluble in cold water, but with hot water makes a turbid, strongly foaming liquid. In alcohol it dissolves in 10 parts boiling, or 130 cold. It is best administered in the form of pills or mixed with Dover's powder. In Bellevue Hospital a favorite form is agaricine 10 grains, atropine sulphate 1 grain, aromatic sulphuric acid 1200 minims. Dissolve and filter. Dose, 10 minims in elixir or syrup.

A fluid extract of the fungus is prepared with alcohol, dose $\frac{1}{3}$ to 1 Cc. (5 to 15 minims).

AGARICUS CHIRURGURUM. Surgeon's Agaric.

The best Agaric for surgeon's use is obtained from beech trees in northern Europe. The interior of the fungus is soaked in hot, weak lye and then boiled and finally beaten with mallets when it becomes soft and pliable and is suited for use of surgeons and dentists. It comes in flat, soft, pliable pieces and consists almost entirely of cellulose. Surgeons use it for absorbing blood and matter and dentists for absorbing moisture in filling teeth.

AGAR-AGAR.

This is a thin, elastic substance resembling gelatine, obtained from sea algæ, found in Eastern Asia and used for the culture of bacteria. The Japanese variety, which is chiefly found in the market, is in flimsy, square sticks, 20 to 30 Cm. long and about 3 Cm. broad. Some varieties are in much larger pieces. This is made into a jelly by boiling with about 200 parts of water and allowing to cool, when it becomes a gelatinous, slippery mass, without taste or odor. When smeared upon glass plates it forms a favorite field for the culture of bacteria.

Until recently agar-agar has been chiefly used as a culture medium for bacteria, but recently it has come into used medicinally. It consists chiefly of **gelose** which forms in presence of water an undigestible jelly, therefore when in the digestive tract it increases the volume of the fæces, thus enforcing evacuation and relieving constipation. For this purpose $\frac{1}{4}$ to $\frac{1}{2}$ ounce of the coarsely comminuted substance should be incorporated with the food taken at a meal. It acts also as a demulcent.

Agaroma, an agar-agar preparation, has been introduced as a laxative in atonic constipation.

Agarase. Tablets claimed to consist of agar-agar and Bulgarian lactic acid bacilli culture. Used in gastro-intestinal disturbances caused by bacteria.

AGAVE. American Aloe.

The century plant or Maguey which grows in Mexico is similar in some respects to the Aloe plant native of Africa. When the leaves are cut or tapped a juice exudes freely which, when fermented, produces an acidulous, slightly laxative beverage, with about the same percentage of alcohol as beer, called **Pulque**. This is the native Mexican drink, well suited to the climate of that country. It is diuretic, slightly laxative and emmenagogue, and has antiscrofulous properties.

AGRIMONIA. Agrimony.

The plant, *Agrimonia Eupatoria*. Native of Europe and North America; called cocklebur and stickwort, (Fam. Rosaceæ). Astringent and tonic. It is useful in catarrh and chronic diarrhoea, also in sore throat and ulceration of the mucous membrane.

A fluid extract is prepared, dose 2 to 8 Cc. ($\frac{1}{2}$ to 2 fl.drachms).

AILANTHUS GLANDULOSA. Tree of Heaven. Chinese Sumach.

The bark of this tree is considerably used throughout India and China, where it is common, as an antispasmodic, astringent and anthelmintic. It

is reputed to be a specific for tape-worm. This is also cultivated as an ornamental tree in this country. The bark contains tannin and a peculiar volatile oil, in which its medicinal properties reside; it is a powerful nerve depressant, purgative and anti-neurotic, used in palpitation of the heart, obstinate hiccough, spasmodic asthma etc.

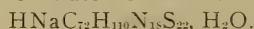
A fluid extract is prepared with $\frac{2}{3}$ alcohol, dose 0.5 to 2 Cc. (8 to 30 minims), larger doses for tape-worm.

ALBUMEN.

The most common and familiar form of Albumen is the white of egg (*Albumen Ovi*), which is freshly obtained from hen's eggs, or may be had in the market dried in scales or granulated. Another variety is obtained from blood and other animal fluids, and still another is found in the juices and seeds of plants.

White of Egg is the only form of albumen used in pharmacy. It is also considerably used in the arts for various purposes, as calico printing, making photographic paper etc. In pharmaceutical preparations the natural white of egg, which contains about $12\frac{1}{2}$ percent. of albumen, is generally used, but dried-egg albumen is sometimes employed.

The chemical composition of albumen has not yet been definitely ascertained. It is the Sphinx of the chemist, and its formula is still written with an interrogation point (?). It has been found however, to contain sodium, sulphur, nitrogen, hydrogen and (white of egg) about 85 percent. of water. Gerhard has given its approximate formula as:



Albumen is but little used in medicinal preparations, but might be more frequently employed to advantage. It forms insoluble compounds with salts of mercury, lead and copper, and some other poisonous substances, and is therefore given in large doses in cases of poisoning by these substances. It forms insoluble compounds with tannin and other vegetable astringents, and may be employed with advantage to detannate preparations which it is desirable to combine with iron etc., as Elixir of Calisaya etc. It is a valuable nutritive, and is given combined with iron, soda and glycerin in the form of a syrup. (See Syrup Iron Albuminate). Its property of coagulating by heat or of precipitating by acids makes it useful for clarifying liquids, wines, syrups, etc. It is used externally in some toilet preparations and liniments, and in many forms combined with wines, cordials etc., as a nutritive drink for invalids.

The combinations of albumen with medicines are frequently called nitrogenized medicines; also protein or proteoid compounds.

Albumen Ovi Siccum. Dried Egg Albumen. This is official in several of the European pharmacopœias, and is a well known article of commerce, being extensively used in mixing dyes for calico printing and for other industrial purposes. It is prepared by drying the white of egg, contained in shallow vessels, in an air chamber at a low degree of heat. When dried the scale is broken up or powdered. It is used in pharmacy for making iron albuminate and some other preparations.

Albumenoids are substances resembling albumen in their general character and composition. **Fibrin** is the chief constituent of muscular tissue and is found in solution in the blood. **Casein** is a constituent of milk, and **Legumin** (called vegetable Casein) of leguminous seeds, beans, peas, almonds etc.

Albuminates are chemical compounds, either soluble or insoluble, of albumen with other substances. The compounds and mixtures generally used will be found under other headings. Glycerites, Syrups, Solutions etc.

ALETRIS. Stargrass. Colic Root. Unicorn Root.

The dried rhizome of *Aletris farinosa* (Fam. *Hæmodoraceæ*).

This drug, which is indigenous to the northern U. S., has been extensively used as an ingredient of remedies for female troubles. It is a bitter tonic, diuretic, purgative and stomachic, seeming to furnish the proper qualities

to recommend its use as a general remedy for female complaints. A fluid extract is prepared; dose 2 to 4 Cc. (30 to 60 minims); a solid extract is prepared for incorporating into pills; dose $\frac{1}{2}$ to 1 grain; and a cordial in which it is combined with uterine tonics has been very popular.

Aletrin. A resinous concentrate from aletris, dose 1 to 5 grains.

ALLIUM. Garlic.

"The bulb of *Allium Sativum*, Linné (Fam. Liliacæ)." <U. S., 1890.

This was official in the 7th revision of the U. S. P. but was dismissed in the 8th. It is official in many of the foreign pharmacopœias.

Garlic is a bulbous plant related to the leek and onion, and having a similar but much stronger, taste and odor. The bulbs are gathered with a portion of their covering husks, and as seen in the market the husks are braided together with the bulbs, making a thick short rope, from which the bulbs are detached as wanted. The bulbs have been used for ages as a condiment and medicinally as a mild stimulant for the stomach and as an addition to expectorants.

The plant yields by distillation an essential oil consisting of allyl sulphide, $(C_3H_5)_2S$, having the same radical as volatile oil of mustard.

Syrup of garlic was official in the 7th revision of the U. S. P., but was dismissed from the 8th.

ALISMA. Water Plantain.

The leaves and rhizome of *Alisma plantago*, (Fam. Alismacæ). Native of Europe and North America. This plant was at one time highly recommended under the name of Mad-dog-weed for the cure of hydrophobia. The bruised plant was applied to the bitten part. It may be used in this manner for the bites of animals or stings of insects, and as a remedy for wounds or swellings. Preparations of this plant are also valuable in the treatment of epilepsy and chorea.

A fluid extract is prepared, dose 2 to 4 Cc. (30 to 60 minims).

ALNUS. Alder.

The bark of several species of alder is used in medicine. In this country *Alnus Rubra*, Tag Alder, is generally used. It is common in the middle and eastern U. S. Its properties are chiefly astringent and alterative, and it is used in scrofulous diseases, syphilis etc., and as a general blood purifier.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

The alder bark, native of Europe and northern Asia (*Alnus Glutineæ*), is a tree about thirty feet high, quite different from the American alder. Its properties being much more astringent.

Alnuin. A concentrate from the bark of *Alnus Rubra*, representing its medicinal properties. Dose 1 to 8 grains.

ALOES. U. S. Aloes.

"The inspissated juice of the leaves of *Aloe vera* (Linné), Webb; *Aloe Chinensis*, Baker; *Aloe Perryi*, Baker; or other species of *Aloe* (Fam. Liliacæ)." <U. S.

Aloes Barbadosis. Br. Barbados Aloes.—"The juice that flows from the transversely cut leaves of *Aloe vera*, Linn; *Aloe chinensis*, Bak.; and probably other species, evaporated to dryness. Imported from the West Indian Islands, and known in commerce as Barbados and Curacao aloes." <Br.

Aloe Socotrina. Br. Socotrine Aloes.—"The juice that flows from the transversely cut leaves of *Aloe Perryi*, Baker; and probably other species of *Aloe*, evaporated to dryness. Imported principally by way of Bombay, and known in commerce as Socotrine and Zanzibar aloes." <Br.

As found in the market aloes consist of the inspissated juice of the leaves of several varieties of *Aloe* found in the West Indies and Africa.

The U. S. and Br. recognize both Barbados and Socotrine aloes, while the P. G. and some other pharmacopœias name Cape aloes, which includes several

different species native of the Cape of Good Hope. The various species are all more or less used in pharmacy, the Barbados and Socotrine being chiefly employed for man and the Cape aloes for horses and cattle.

The fleshy leaves of the aloe are cut off near their base and their juice allowed to drain into troughs or vessels. The collected juice is then evaporated to the consistence of an extract and run into boxes, kegs or gourds, in which shape it is brought to the market.

Aloes is a well-known and much used purgative, being familiarly known in the household as "Picra." It is the active ingredient in most patent and cathartic pills. In small doses, 1 to 2 grains, it is a tonic stomachic, and is the chief ingredient of several "bitters" which have been extensively sold. The laxative dose is 2 to 4 grains, and the dose as an active purgative is 10 to 13 grains.

Various preparations of aloes will be found in Part II. under their proper headings, as extracts, pills, powders, tinctures, wines etc.

Aloin. A neutral principle obtained from aloes, and representing its properties. It is prepared chiefly from Curaço aloes. It is official in the U. S. P. See Aloinum, Part II. Average dose 0.065 Gm. (1 grain).

ALSTONIA CONSTRICTA. Bitter Bark. **Australian Fever Bark. Also called "Dita."**

This tree is a native of New South Wales and Queensland. A fluid extract is prepared from the bark, also an alkaloid which is somewhat used in fevers prevalent in these countries.

Alstonia Scholaris or **Dita Bark** is found in the Philippines, and is another specie, having similar characteristics, the alkaloids of which have similar properties.

Alstonine. $C_{21}H_{20}O_4$. This is used in the treatment of typhus and typhoid fevers with much success.

Porphyrine. $C_{21}H_{23}N_3O_3$, and **Alstonidine** are also obtained from the bark and have properties similar to the foregoing.

Ditamine, $C_{16}H_{19}O_2$, **Echitamine,** $C_{22}H_{28}N_2O_2 + H_2O$, and **Echitemine,** $C_{21}H_{27}NO_4$ are obtained.

ALTHÆA. Marshmallow. U. S.

"The dried root of *Althæa officinalis*, Linné (Fam. Malvaceæ), collected from plants of the second year's growth and deprived of the pericardium." <U. S.

As found in the market it is usually in small, irregular cubical pieces, made by cutting the root transversely. It is very mucilaginous and is used chiefly as a demulcent, in the form of decoction or syrup. The leaves are sometimes employed as an emollient poultice and the powdered root may be employed as an adhesive and drier in making pills and suppositories.

AMBRA GRISEA. Ambergris.

This is a morbid product found in the intestines of the sperm whale, or floating on the water, or cast upon the sea shore after being ejected from the whale.

Owing to the demand for this substance and its rarity it commands a very high price. It is recommended for hysteria and spasmodic affections with special influence on the generative organs, but is little used in medicine. In perfumery it is extensively employed to give permanence to volatile odors. A tincture is prepared for use in perfumery and medicine.

AMBROSIA. Ragweed.

The common roadside weed, *Ambrosia artemisiæfolia*, is an astringent, anti-septic and styptic. It is employed in domestic practice in the form of decoction for fevers and catarrhal conditions. A fluid extract is prepared with diluted alcohol. Dose 5 to 20 minims. *A. trifida*, is another variety also used in medicine.

AMMONIACUM. Br. *Ammoniacum*.**Gum Ammoniac.**

"A gum-resin exuded from the flowering and fruiting stem of *Dorema Ammoniacum*, Don., and probably other species." <Br.

This gum contains about 25 percent. of gum and 70 percent. of volatile oil and a little residue. It was formerly official in the U. S. P., and is still official in several of the pharmacopœias. It forms an emulsion when rubbed with water and is sometimes employed as an expectorant and stimulant. It may also be given in powders, the dose being from 5 to 15 grains.

Resorcinol. The chief chemical product of this gum is Resorcinol, which is now considerably used. This is described in Part II. under the title Resorcinol.

AMPELOPSIS. American Ivy. Virginia Creeper.

This plant, also commonly called woodbine, is indigenous to northern America. The young branches and bark should be collected for use in autumn. It is alterative, tonic, astringent and expectorant; useful in scrofula, syphilis, dropsy, bronchitis etc.

A fluid extract is prepared with diluted alcohol, dose 1 to 3 Cc. 15 to 45 minims).

Ampelopsin. A concentrate obtained from this drug in the manner directed for making concentrates. It represents the active properties of this drug. Dose from 2 to 8 grains.

AMYGDALA. Almond.

"**Amygdala amara**, Bitter almond. The ripe seed of *Prunus Amygdalus*, Stokes; var. *amara*, De Candolle (Fam. Rosaceæ)." <U. S.

"**Amygdala dulcis**, Sweet almond. The ripe seed of *Prunus Amygdalus*, Stokes; var. *dulcis* (Fam. Rosaceæ)." <U. S.

Amygdala Amara and **Amygdala Dulcis** are official in the U. S., Br., and nearly all of the pharmacopœias. The kernel of the nut is used. The fruit is a green velvety drupe containing a stone or nut which encloses the seed. From this expressed oil of almonds is obtained from either the bitter or the sweet, by expression; and from the bitter almond the volatile oil of bitter almond is obtained by moistening the ground nuts with water, allowing them to stand 12 to 23 hours during which time partial fermentation ensues, then distilling to obtain the volatile oil.

Almonds are also used for making emulsions, and almond meal is a favorite toilet requisite for softening the skin and allaying irritation.

Blanched almonds are prepared by soaking almonds in water for several hours, then removing the outer covering or skin, which then rubs off easily.

Amygdalin. A white, crystalline constituent of bitter almonds, having the nature of a glucoside. It may be obtained from bitter almonds by first freeing them from oil by pressure, then exhausting by boiling with successive portions of alcohol, distilling off most of the alcohol until the residue is of the consistency of syrup. This residue is then to be diluted with water and fermented by the addition of yeast. After fermentation, filter, concentrate to the consistency of syrup by evaporation and add it to the cold alcohol which precipitates the amygdalin together with gummy matter; boil the precipitate with alcohol, filter and allow to crystallize.

Emulsin. Another constituent of almonds. It is this substance which, interacting with amygdalin in bitter almonds develops, in the presence of moisture, the volatile oil and hydrocyanic acid.

AMYLUM. U. S., Br. *Starch*.

"The starch grains obtained from the fruit of *Zea Mays*, Linné (Fam. Gramineæ)." <U. S.

"The starch procured from the grains of common wheat, *Triticum sativum*, Lam.; maize, *Zea Mays*, Linn.; and rice, *Oryza sativa*, Linn." <Br.

This substance is more familiar to the grocer than the druggist. It exists in plants, and is obtained from various grains, tubers, roots etc., by separating it in various ways from the other substances with which it is associated. The starch obtained from various substances does not differ in chemical composition, but only in physical appearance. The U. S. P. directs starch obtained from the seed of common corn; the Br. P. mentions wheat, corn or rice starch as official; but in pharmaceutical practice starch from almost any source is used, as the druggist uses whatever is furnished by the manufacturers. It is prepared by manufacturers by grinding the grain to a fine powder, washing it with an abundance of water, from which the starch is allowed to settle, then draining off the water and drying.

In the industrial arts starch is extensively employed for many purposes. The manufacture of **grape sugar** or **glucose** from starch has been developed to an important industry in this country. **Dextrin** is also a derivative of starch considerably used in manufacturing and the arts.

In pharmacy starch is employed as a dusting for pills, suppositories etc., an ingredient in toilet powders and for making several preparations. In medicine starch is made into demulcent food for invalids and is used in the form of dust, decoction or glycerite, extensively, to allay inflammation, prevent chafing etc. Some of its compounds are used internally to prevent the irritation of caustic medicines.

Varieties of Starch. Wheat, rye, corn, rice and potato starch are the varieties usually known in the market as starch. Starch obtained from any or all of these substances is known as laundry starch, but "corn starch" is put up in packages especially as an article of diet.

Arrowroot, (*Maranta*), is a starch obtained from the rhizome of *Maranta arundinaceæ*. It was formerly official but has now been deleted. It is used as a nutritious food for invalids. Much of the "arrowroot" that is sold however, consists only of our common varieties of starch.

Sago, prepared from the pith of the sago palm, and **Tapioca**, prepared from the tubers of tapioca or cassava plant, are familiar varieties of starch used as food. **Rice** and **Pearl Barley**, as they are sold by grocers, consist mainly of starch.

ANACARDIUM OCCIDENTALE. Cashew-Nut.

This tree yields a gum similar to gum arabic, which is known in France as "gomme d'acajou." The fruit is pear-shaped and edible, of a pleasant acid flavor. It has been used for dropsy and uterine troubles. It bears at its summit a kidney-shaped nut, consisting of two shells, with a black acrid juice between, the inner shell containing an oily nut. The black juice is used in the West Indies as an application for warts, corns, ringworm, ulcers etc., which it is said to cure. An acid has been obtained from it known as **Anacardic Acid**, which acts as an acid poison, and a yellow, oleaginous liquid called **cardol**.

ANCHUSÆ RADIX. Alkanna Root. Alkanet Root.

The root and rhizome of *alkanna tinctoria*. This is an herbaceous plant found in Hungary and the Grecian Archipelago, and in Asiatic Turkey. It is used in medicines as a red coloring ingredient having similar properties to madder roots. It is particularly useful for coloring oils or glycerin to which it imparts a bright red color.

Alkanin inspissated. This is prepared by evaporating an alcoholic tincture of alkanet root to an extract. It is very convenient for coloring alcoholic or oil preparations or fats, a red color. It is not suitable for aqueous preparations.

ANDROGRAPHIS.

The dried plant, *Andrographis paniculata*, which grows wild in India, is commonly known in its native country as "Kiryat," or "Creyat," and possesses properties similar to chiretta. It is used as a bitter tonic, also as a remedy for renal catarrh.

ANEMOPSIS CALIFORNICA. Yerba Mansa.

This plant is obtained in California and is of the family Lauraceæ. It is used particularly in diarrhoea and dysentery. A tincture is prepared by macerating one part of the fresh root in two parts of alcohol. The dose is $\frac{1}{2}$ to 4 Cc. (10 to 60 minims).

ANETHI FRUCTUS. Br. Dill Fruit.

"The dried ripe fruit of *Peucedanum Graveolens*." B. and H. < Br.

This is official only in the Br. P. It is used for preparing dill water, by distilling the fruit (seeds) with water.

Dill pickles are a favorite relish and are prepared by adding sprigs of dill with the cucumbers when they are placed in the pickle.

ANGELICA.

The dried root or the seed of *Angelica*, or *Archangelica officinalis*. Several varieties are official in European countries.

Radix Angelicæ. *Angelica* root. This plant has a long, thick, fleshy biennial root, which as found, dried in the market is quite wrinkled externally and rather soft and waxy internally. It has a strong peculiar aromatic odor, and is somewhat used in perfumery and compound flavors, especially for liqueurs, cordials and bitters; and in medicine it is aromatic, stimulant, tonic and carminative. A fluid extract is prepared; dose 1 to 4 Cc. (15 to 60 minims).

Fructus Angelicæ. *Angelica* Seed. The seed has similar properties as the root and is used for similar purposes. An Oil of *Angelica* is obtained from either the roots or the seeds by distillation.

ANISUM. U. S. Anise. Aniseed.**Anisi Fructus.** Br. Anise Fruit.

"The dried ripe fruit of *Pimpinella Anisum*, Linné (Fam. Umbelliferae), obtained from cultivated plants." < U. S.

This is a favorite flavoring for many kinds of medicine. An oil is prepared by distillation and an essence or spirit by dissolving the oil in alcohol.

Average dose.—0.500 gm.=500 milligrammes ($7\frac{1}{2}$ grains).

The Anise official in the U. S. and Br. P. is commonly known in Europe as "Green Anise," the fruit of the herb, *Pimpinella Anisum*, while "Star Anise," the fruit of *Illicium verum*, is obtained from a small tree indigenous to the southern part of China. Oil of Anise is distilled from both these plants and is practically, identical, but the fruits are entirely unlike.

Anethol. $C_{10}H_{12}O$.—This exists in the volatile oil distilled from anise in two forms, the crystalline or anise camphor which is the chief constituent and is heavier than water, and the liquid anethol which is lighter than water.

Anisic Acid. $C_8H_8O_2$.—This is official in the Mex. Pharm., and is prepared by treating anise oil with nitric acid, which oxidizes anethol, producing crystals of the acid. It is similar in its action to salicylic acid.

ANTHEMIS. U. S. Chamomile.**Anthemidis Flores.** Br. Chamomile Flowers.

"The dried flower-heads of *Anthemis nobilis*, Linné (Fam. Compositæ), obtained from cultivated plants." < U. S.

These flowers, commonly called Roman chamomile, are cultivated in Europe, and are used in all countries as a stimulating tonic and carminative. In domestic medicine chamomile is a favorite, being used in the form of a weak infusion (chamomile tea) to produce diaphoresis and diuresis, and externally in the form of hot fomentation for pain, colic etc.

Average dose.—2 drachms (30 grains).

An extract and a fluid extract are prepared from chamomile, and a volatile oil is distilled from the fresh blossoms by steam.

Anthemis Cotula. May Weed. A common roadside weed having properties and uses similar to *Anthemis nobilis*, but seldom used except as domestic medicine.

APIUM. *Apium Graveolens.* Celery.

During the past few years, preparations of celery have come into considerable use as a general tonic, diuretic and stimulant. Celery preparations have been extensively advertised as proprietary compounds. Fluid extract of celery root and seed is in considerable demand. Formulas for them will be found among the fluid extracts also formulas for proprietary celery compounds in Proprietary Medicines.

Apium Petroselinum. Parsley.—The fluid extract and oil of parsley, also the following:

Apiol. $C_{12}H_{10}O_4$. A crystalline camphor obtained from the fruit or root in the form of white needles, melting at $30^{\circ}C$. ($86^{\circ}F$.).

Liquid Apiol. Apiol Oleo-resin.—Prepared by exhausting powdered parsley seed with ether or benzin, distilling off the ether or benzin, or allowing the liquid to evaporate, and pouring off the clear oleo-resin from any sedimentary matter. This is most generally known as "apiol" and is put up in the form of pearls or capsules. A green and a yellow variety are furnished by manufacturers. To prepare crystalline apiol (as above), the oleo-resin is treated with alcohol which dissolves it from its solution in the oleo-resin. It is then evaporated and crystallized. Both preparations are recommended in amenorrhœa and dysmenorrhœa and in dropsical affections. The dose is from 5 to 16 grains.

Apioline. This is a French preparation introduced by Chapoteaut, claiming to be the active principle of parsley seed. It is a thick, reddish liquid of sp. gr. 1.113, readily soluble in alcohol. It is put up only in 3 grain capsules and is used for the same purpose as Apiol.

APOCYNUM. U. S. Canadian Hemp.

"The dried rhizome of *Apocynum cannabinum*, Linné (Fam. Apocynaceæ)." <U. S.

This is official only in the U. S. It is a powerful emetic and cathartic, and in small doses diaphoretic and expectorant. It has been proven a very powerful remedy for dropsy. A fluid extract is official. The dose of the powdered root as a diaphoretic is 3 to 4 grains, as a cathartic 5 to 8 grains, as an emetic 15 to 20 grains.

A fluid extract is prepared with two-thirds alcohol, dose $\frac{2}{3}$ to 1 Cc. (10 to 15 minims).

Apocynum Androsæmifolium, Bitter Root, is another variety which is considerably employed in Eclectic practice.

Apocynin. A resinoid obtained by pouring a concentrated extract of apocynum into cold water in which it is precipitated. This is considerably used by Eclectics.

Apocynein. A glucoside obtained from apocynum, readily soluble in water, but little used in medicine.

ARALIA.

A number of plants bearing this general title are used in medicine. They are all indigenous to the U. S., although different varieties are found in various parts of the country. They are all generally stimulant and alterative, acting upon the secretions and used as depuratives and blood purifiers.

Aralia Canadensis. This name is given by some writers to Ginseng found in Canada and northern U. S. It is used medicinally as a stomachic, mild tonic and nerve stimulant. Dose from 5 to 15 grains ($\frac{1}{3}$ to 1 gm).

Aralia Hispidæ. Dwarf Elder. The root-bark is employed as a diuretic, alterative and blood purifier. A fluid extract is prepared, dose 1 to 4 Cc. (15 to 60 minims).

Aralia Nudicaulis. American or False Sarsaparilla. The root is stimulant, diuretic and alterative. A favorite domestic blood purifier. Usually used in decoction. Dose 1 to 4 gm. (15 to 60 grains).

Aralia Racemosa. Spikenard. A stimulant and expectorant. A decoction or syrup made from the fresh or recently dried root is much esteemed for coughs and dyspepsia. A fluid extract is prepared; dose 1 to 4 Cc. (15 to 60 minims).

Aralia Spinosa. Prickly Elder. This is a southern variety quite popular for chronic rheumatism and skin diseases. The negroes regard it an antidote for rattlesnake bite used internally and externally. The fresh or recently dried bark is used. A fluid extract is also made; dose 1 to 4 Cc. (15 to 60 minims).

ARAROA. Goa Powder. Crude Chrysarobin.

This is a powder obtained from longitudinal fissures in the trunk of *Andira Araroba*, a large leguminous tree native of Brazil. It is the crude powder from which chrysarobin, official in the U. S. and Br. P., is prepared. See Chrysarobinum.

ARECA CATECHU. Betel Nut. Areca Nut.

The seed of *Areca Catechu*, Linné (Fam. Palmaceæ). The Betel tree is a native of Cochin China and the Malay Peninsula, but is now extensively cultivated in the Philippines and in tropical India. The seed is about the size and shape of the nutmeg and has similar markings on its exterior but is of a red-dish-brown color.

The powdered areca nut is used in doses of a teaspoonful, as a vermifuge and in doses of 1 to 4 fl.drachms for tape-worm. It is also used for tape-worm in dogs. A very fine charcoal for tooth powder is made from the nut. A fluid extract is also prepared from the nut.

Arecine. An active crystalline alkaloid principle of the nut, ($C_7H_{11}NO_3 + H_2O$). Soluble in water, is a powerful remedy for tape-worm.

Arecoline is also found as a constituent of the nut, possessing similar medicinal properties. It is a strongly alkaline liquid alkaloid, ($C_8N_{13}NO_2$). Soluble in water, alcohol, ether or chloroform. The dose is $\frac{1}{15}$ grain.

Arecoline Hydrobromide. $C_8H_{13}NO_2 \cdot HBr$. This is a salt of the alkaloid arecoline. It is employed as a myotic, a few drops of one percent. solution being instilled into the eye, and is used by hypodermic injection for colic.

Arecoline-Eserine. A mixture of equal parts of arecoline hydrobromide and eserine. Used as a myotic and in veterinary practice as a cathartic. Dose for horses, $\frac{3}{4}$ to $1\frac{1}{2}$ grain hypodermically.

ARMORACIÆ RADIX. Br. Horseradish.

"The fresh root of *Cochlearia Armoracia*, Linn." <Br.

This plant which is cultivated in gardens or grows along the roadside in damp soil is highly esteemed as a relish, the roots being grated, while fresh for the table. In domestic medicine the fresh leaves are wilted by fire or heat and applied as a counter-irritant for pain, having an action similar to mustard.

The root is macerated with other plants in alcohol and made into a tincture or spirit distilled from the mixture. *Oleum Cochlearia*, a volatile oil, may be obtained by distillation and is the same as volatile oil of mustard, very pungent and acrimonious. When treated with ammonia crystals of **thiosinamin** may be obtained. Preparations of this plant have been found effective in scorbutic affections, scurvy, dropsy etc., and the root is used in making many relishes and prepared mustards.

ARNICA.

"**Arnica.** The dried flower-heads of *Arnica montana*, Linné (Fam. Compositæ)." <U. S.

"**Arnica Rhizome.** The dried rhizome and roots of *Arnica montana*, Linn." <Br.

Arnica flowers are official in the U. S. P. Arnica rhizome in the Br. P.

The plant is native of Europe and Siberia. It is used internally as a stimulant for the heart and kidneys, but is chiefly used externally in several liquid forms as an application for cuts, sprains, bruises etc.

A fluid extract is prepared, both from the flowers and the root, and a tincture and liniment from either the flowers or the root, which are the most general forms of application. Arnica ointment and arnica plaster are also employed externally.

Arnicine. This is a yellow, acid, bitter, amorphous compound found in the arnica plant. It has the same properties as the drug.

ARNOTTA. Annatto. Orleana.

A pasty mass of the consistence of stiff putty, prepared from the pulp surrounding the seeds of *Bixa Orellana*, a tree found in Guiana and South America.

The pulp is separated from the seeds and mashed with water, then strained and allowed to settle, the insoluble portion being collected, drained, kneaded and partly dried to a tough mass. It is of an orange-red color and is used for coloring orange and yellow, either fabrics, food products or pot-mades. It is soluble in oils but not in water, except by the addition of an alkali. It is much used for coloring butter and cheese.

Annattoine. The coloring matter of annatto, in the form of coarse powder. Soluble in oils.

ARTEMISIA.

Under this botanical title several important medicinal plants are included, but those that are official, as *absinthium* and *santonica* are noted under their pharmaceutical titles.

Artemisia Abrotanum. Southernwood. Old Man. The flowering tops are anthelmintic, tonic and narcotic. Useful in dyspepsia, jaundice and as a vermifuge.

A fluid extract is prepared, dose $\frac{3}{4}$ to 1 Cc. (10 to 15 minims).

Artemisia Dracunculus. Tarragon. This is a European variety allied to wormwood and cultivated for its aromatic leaves, which are used for flavoring salads and sauces and for making **Tarragon Vinegar**, which is prepared by steeping or macerating the leaves of the plant in vinegar.

Artemisia Frigida. Mountain Sage. Sierra Salvia. This plant grows throughout the Rocky Mountains and Sierras. It is aromatic and antiperiodic, being used as a substitute for quinine in the treatment of fevers and malaria. A fluid extract is prepared. Dose 1 to 2 fl.drachms.

Artemisia Mexicana. Mexican Wormwood. This variety of wormwood indigenous to Mexico, is called "Estafiate" in that country. It is similar to common wormwood and is official in the Mex. P.

Artemisia rupestris. Alpine Wormwood. Genepi. This variety known as *genepi blanc*, is found in Switzerland, and is employed as an ingredient of Absinth, Benedictine, Chartreuse and other cordials prepared in that country. The French call it "Absinthe Suisse ou des Alpes." It is used locally as a vulnerary, tonic, stomachic, febrifuge and emmenagogue.

Artemisia vulgaris. Mugwort. The flowering tops are emmenagogue and diaphoretic. Useful in epilepsy, chorea and amenorrhœa.

A fluid extract is prepared, dose 1 to 4 Cc. (15 to 60 minims).

ARUM. Wild Turnip. Indian Turnip.

Dragon-root. Wake-robin.

The dried tuber of *Arum triphyllum* (Fam. Aracæ).

This variety of Arum is common in the northern U. S. and Canada. *Arum maculatum*, the European variety, has similar properties. Wild turnip when recently dried is very acrid, but loses this property from long standing. It is given internally to stimulate expectoration and the action of the skin. It is useful for asthma, bronchitis, chronic catarrh and rheumatism. A fluid extract is prepared; dose 1 to 2 Cc. (15 to 30 minims).

ASAFETIDA. U. S., Br. Asafetida.

"A gum-resin obtained from the root of *Ferula foetida* (Bunge) Regel, and probably other species of *Ferula* (Fam. Umbelliferae)." <U. S.

This gum-resin is obtained by making incisions into the large schizogenous ducts of the root, which are filled with a milky emulsion. The milky juice exudes and upon exposure to the air hardens, forming the gum-resin, which is collected by natives and sent to seaports of Bombay or elsewhere for export.

Asafetida is a valuable nerve tonic, antispasmodic and expectorant, and except for its disagreeable "smell" would be much employed in medicine. As it is, it is chiefly dispensed in the form of coated pills, although a tincture is official in the U. S. P. and Br. P. The dose of the gum-resin is 0.250 gm. (4 grains).

ASARUM. Radix Asari.**Wild Ginger. Canada Snakeroot.**

The dried rhizome and roots of *Asarum Canadense* (Fam. Aristolochiaceae).

This plant is indigenous to Canada and the northern United States, growing in rich moist woods. The entire plant is aromatic but more particularly the long, jointed, creeping root.

It is used in medicine as an aromatic and stimulant, and an extract prepared from it is used in making flavoring compounds and in perfumes to give them permanence. It is a tonic, stimulant and carminative, and, in the form of hot infusion, diaphoretic. A fluid extract is prepared; dose 1 to 2 Cc. (15 to 30 minims).

ASCLEPIAS. Pleurisy Root. Butterfly Weed.

"The root of *Asclepias tuberosa*, Linné (Fam. Asclepiadeae)." <U. S., 1890.

This was official in the 7th revision of the U. S. P. but was dismissed in the 8th. It is one of several species of *Asclepias* found in this country but differs from them in not exuding a milky juice when cut or bruised. Only the tuberous root of the plant is used in medicine. It is a diaphoretic and expectorant and is employed in fevers, pneumonia, pleurisy and other affections of the lungs. The dose is from 20 to 30 grains or an equivalent quantity of the fluid extract. Other varieties of *Asclepias* are sometimes employed in medicine. *A. incarnata* and *A. Syriaca* (common silkweed) may be mentioned.

A fluid extract is prepared from pleurisy root with alcohol, dose 2 to 10 Cc. ($\frac{1}{2}$ to $2\frac{1}{2}$ fl.drachms).

A fluid extract is prepared from *Asclepias Incarnata* with alcohol, dose 0.6 to 5 Cc. (10 to 40 minims).

A fluid extract is prepared from *Asclepias Syriaca* or *cornuti* with alcohol, dose 0.5 to 2.5 Cc. (8 to 40 minims).

Asclepias Curassavica. Blood-Flower. This species of *Asclepias* is a native of the West Indies and is distinguished from other species by having a blood-red flower. The root and the expressed juice from the plant are used as emetic, vermifuge and tænicide, the dose of the root being from 20 to 40 grains and of the juice, a fluid ounce.

A fluid extract of the herb is prepared, dose 4 to 8 Cc. (1 to 2 fl.drachms).

Asclepin, which is supposed to be the active principle of the plant is prepared by precipitating a concentrated extract. It was introduced by the Eclectics and has properties similar to the root.

ASIMINA. Pawpaw. Pawpaw Custard-Apple.

The fruit and the root-bark of *Asimina triloba*, (Fam. Anonaceae), a small tree. Native of northeastern U. S., New York to Iowa. The fruit is the size of a large egg and contains a yellow edible pulp of custard-like consistency, useful for dyspepsia and gastric catarrh. The seeds yield an alka-

loid, asimine, and a volatile oil. The bark is a tonic, especially for catarrhal conditions of the stomach or digestive tract.

Dose 1 to 4 gm. (15 to 60 grains).

ASPARAGUS. *Radix Asparagi*.

The fresh roots and young shoots of *Asparagus officinalis* (Fam. Liliaceæ).

A well known cultivated herbaceous plant, the young shoots of which are extensively used for food, and the root in medicine as a cardiac sedative, diuretic and for dropsy. A fluid extract of the root is prepared. Average dose 1 to 4 Cc. (15 to 60 minims).

Asparagin. A principle prepared from the root representing the active properties of the plant.

Asparol. A brand name for a fluid extract of asparagus tops prepared in Berlin. It is recommended for diabetes and kidney disease.

ASPIDIUM. U. S. Male Fern. *Filix Mas*. Br. Male Fern.

"The dried rhizome of *Dryopteris Filix-mas*, Schoot; or of *Dryopteris marginalis*, Asa Gray (Fam. Filices)." <U. S.

"The rhizome of *Aspidium Filix-mas*, Schwartz." <Br.

From this is prepared *Oleo-resina Aspidii*, U. S.; *Extractum Filicis Liquidum*, Br.; and unofficial fluid extracts.

The powdered drug is also given in combination with other medicines as a remedy for tape-worm. Filicic acid and Pannic acid have been obtained from varieties of this plant.

* ASPIDOSPERMA. *Quebracho*.

This was official in the 7th revision of the U. S. P. but was dismissed in the 8th. It is the bark of a large tree, native of Brazil, used as an antiperiodic and for difficulty of breathing, (dyspnœa), in asthma, bronchitis, phthisis etc. Dose of the powdered bark, 10 to 45 grains. A fluid extract was official in the U. S. P., 1890, with alcohol 3, water 1, dose 1 to 3 Cc. (15 to 45 minims).

Aspidospermine. $C_{22}H_{40}N_2O_2$. An alkaloid obtained from the bark of *aspidosperma quebracho*. It is in colorless crystals, insoluble in water, but soluble in about 50 parts of alcohol. It is given as a stimulant to the respiratory organs in asthma and other difficulties of breathing. The dose is $\frac{1}{4}$ to $\frac{1}{2}$ grain, repeated if required.

AURANTIUM. *Orange*.

The rind of the fruit of bitter and sweet orange are both official in the U. S. P., but in most pharmacopœias only the bitter orange is recognized.

Aurantii Amari Cortex. U. S. Bitter Orange Peel.—"The dried rind of the unripe fruit of *Citrus Vulgaris*, Risso (Fam. Rutaceæ)." <U. S.

A fluid extract is prepared with $\frac{2}{3}$ alcohol, dose 2 to 5 Cc. (30 to 75 minims).

Aurantii Cortex Siccatus. Dried Bitter Orange Peel, Br.—**Aurantii Cortex Recens.** Fresh Bitter Orange Peel, Br.

Bitter orange peel, either dry or fresh, is used for medicinal preparations in nearly all countries. It is chosen on account of its agreeable flavor and its bitter-tonic properties.

Aurantii Dulcis Cortex. U. S. Sweet Orange Peel.—"The recently separated and outer rind of the ripe fruit of *Citrus Aurantium*, Linné (Fam. Rutaceæ)." <U. S.

It is also official in the Port. P. under the title *Laranjeira Doce*.

Tinctura Aurantii Dulcis and *Syrupus Aurantii* are made in the U. S. from sweet orange peel.

Oil of orange is obtained from either the sweet or the bitter oranges, but more generally from the sweet. A fluid extract and tincture are prepared from the bitter orange, and the dried peel is considerably used as an ingredient of compound tinctures, bitters etc.

Fructus Aurantii Immaturi. Immature Orange Fruit, Orangette, Petit Grain, Fr. (Official in several European Pharmacopœias). Used as an ingredient in aromatic mixtures.

Flores Aurantii. Orange Flowers. (Official in several countries of southern Europe). In pharmacy orange flowers are used for making orange-flower water. (Which see).

AVENA. Oats. Fructus Avenæ.

The dried fruit of *Avena sativa*, commonly called oats.

Fructus Avenæ Excorticatus. Decorticated Oats. Oats with the outer covering removed.

Avena farina. Oat Meal. Rolled Oats. Oats are official in several of the European pharmacopœias. Prepared in various ways, oats are a very important article of food for the human race, as well as for horses and cattle.

A concentrated tincture of *avena sativa* was at one time popular as a semi-proprietary medicine. It will be noticed among the tinctures.

Avenine. A concentrate or resinoid obtained from oats by precipitating a concentrated alcoholic extract. It is claimed to contain the alkaloidal principles of oats. It is employed as a nerve stimulant. Dose $\frac{1}{120}$ to $\frac{1}{60}$ grain in pills.

Avenose. A mixture of oat flour and soluble acorn-malt extract, prepared in Germany.

AZADIRACHTA INDICA.

Indian Azadirach. Neem or Margosa Bark.

This is the dried bark of the stem of *Melia Azadirachta*, (Linné); native of India, where it is commonly known as "Neem bark" or "Margosa bark." It is tonic and antiperiodic and is official in the Indian and Colonial Addendum. It has properties similar to quassia and contains a bitter alkaloid named "Margosine" and an acid substance named "Margosic acid."

BACCÆ. BERRIES.

The fruits of certain plants are known commercially as "berries." They are usually globular, ovate, obovate or capsular, and may be either the soft fruit enclosing the seeds, as the gooseberry or currant, or bearing seeds on the outside as the blackberry and strawberry, or the dry berries like cubeb and fish-berries, or the dried fruit like juniper, buckthorn, prickly ash, poke, etc. Berries will be noticed under the pharmaceutical titles of the plants which produce them.

BALSAMA — BALSAMS.

Balsams or Balms (Fr. Baumes), as they are known in pharmacy, embrace a variety of natural and prepared substances supposed to possess healing or soothing virtues. As popularly known they include not only the natural balsams obtained from balsam-bearing trees, but a variety of preparations ranging in consistence from tinctures to ointments, which have derived the name "balsams" from properties claimed for them by their originators. Under this heading only the true balsams which are obtained from balsam-bearing trees will be included. Other balsams will be found under other headings where they more properly belong.

True Natural Balsams.

The True Natural Balsams may be defined as oleo-resinous substances either semi-liquid, or semi-solid, or solid, obtained from plants, and containing benzoic, cinnamic, or some analagous acids.

Only two balsams are official in the U. S. P. and Br. P. Several other substances are thus classed but some of these are not known commercially as balsams. The natural balsams are as follows:

Balsam of Calaba—*Tacamahaca*.—Baume Vert. Fr. This is obtained from the trunk, branches and leaves of *Calophyllum Calaba*, or Santa Maria tree. It is a liquid, at first white, but soon becomes olive-green, and is sometimes called Green Balsam. A similar balsam is obtained from *chloroxylon verti-*

cillatum of Peru, which is popularly called **Green Balsam** (of Peru). They contain benzoic acid.

Balsam of Peru.—*Balsamum Peruvianum*. U. S., Br. A liquid balsam obtained from *Myroxylon* or *Toluifera Pareira*, containing cinnamic and benzoic acids, and some other allied compounds. This balsam exudes from the trunk of the tree after the bark has been beaten and scorched. A solid or semi-solid variety is also imported, but not frequently kept by druggists.

Balsam of Peru is used as a stimulant to the mucous membrane, and in stimulating ointments etc. Also as a preservative for fats. As found in the market, it is frequently adulterated with, or entirely fabricated from other substances.

Balsam of Tolu.—*Balsamum Tolutanum*. U. S., Br. A balsam obtained from *Myroxylon Toluifera*, or *Toluifera Balsamum*, containing cinnamic and benzoic acids and volatile oils, called **benzyl benzoate**, $C_7H_5(C_7H_7)O_2$, and **benzyl cinna-mate**, $C_9H_7(C_7H_7)O_2$, a terpene named *Tolene*, $C_{10}H_{16}$, and resins. It is a semi-liquid, as first obtained from the trees, but concretes into a solid resinous mass by standing. It is obtained by making incisions in the trunk of the tree from which it is collected in small cups. It is much used in cough remedies as an agreeable aromatic, and in the form of tinctures and syrups is very frequently prescribed.

Benzoinum. Benzoin or Benjamin. U. S., Br. Commercially classed as Gum Benzoin. A solid balsamic resin, obtained from *Styrax Benzoin*, containing benzoic acid, cinnamic acid, a fragrant volatile oil and resins. Vanillin is also found in some varieties.

In pharmacy it is used as a preservative for fats and in making toilet preparations and in medicine as an aromatic stimulant and expectorant. The dose is 10 to 15 grains.

Benzoyl.— C_7H_5O .—This is the radical of an extensive series of aromatic compounds which are derived directly or indirectly from Benzoin.

Benzoic Acid.— $HC_7H_5O_2$.—This is obtained from benzoin and other balsams by sublimation, and is also made artificially from coal-tar hydro-carbons. It forms with bases a class of salts—Benzoates, now considerably used in kidney diseases. It is stimulant, expectorant and antiseptic; the usual dose being from 5 to 10 grains in mucilage or syrup. (See *Acidum Benzoicum*).

China Varnish Balsam.—An aromatic varnish-like exudation, obtained from *Aguai Sinensis*, containing benzoic acid and other similar compounds. It is used by the Chinese for preparing the varnish or lacquer so celebrated in that country.

Styrax or **Storax.**—U. S., Br. *Styrax Præparatus*, Br. Prepared Storax, Liquid Styrax, Storax. A balsam prepared from the inner bark of *Liquidamber Orientalis*, containing cinnamic and benzoic acids, **Styracin**, $C_9H_7(C_6H_5)O_2$, **Storecin**, $C_{26}H_{35}O_3$, **Ethel Cinnamate**, $C_8H_7(C_2H_5)O_2$, **Phenyl-propyl Cinnamate**, $C_9H_7(C_6H_{17})O_2$, **Styrol**, C_8H_8 , resins etc.

It is a semi-liquid grayish-green balsam, used in pharmacy in making compound tincture of benzoin, and as a preservative for fats etc. Also used in perfumery.

Liquidambar or **Sweet Gum.**—A balsamic exudation from *Liquidambar Styraciflua*. The constituents and properties of this balsam seem to be identical with Storax, but it differs from it in being, as found in the market, a resinous gum instead of a liquid.

Other Natural Balsams.

The following natural exudates are commercially known as balsams, but pharmaceutically are classed with oleo-resins, turpentine, resins etc., under which headings they will be more fully noticed:

Balsam Copaiba, **Copaiba Balsam** or **Copaiba.**—Oleo-resin.

Balsam of Fir, **Canada Balsam** or **Canada Turpentine.**—Turpentine.

Gurjun Balsam, or **Wood Oil**, from *Balsamum Dypterocarpi*.—Oleo-resin.

Hungarian Balsam, from *Pinus Pumilio*.—Turpentine.

Japan Varnish Balsam or **Japan Lacquer.**—From a species of *Sumac*.

Balsam of Mecca or **Balm of Gilead.**—Oleo-resin.

Balsam Rackasiri.—Turpentine, from *Bursera balsamifera*. India.
 Balsam of Riga or Carpathina Balsam, from *Pinus Cembra*.—Turpentine.
 Turpentine Balsam, Turpentine Gum or Gum Thus.—Turpentine.
 Venice Turpentine Balsam.—Venice Turpentine.—Turpentine from *Larix Europæa*.

BAPTISIA. Wild Indigo.

The dried root of *Baptisia tinctoria* (Fam. Leguminosæ).

A perennial herb grown in dry, sandy soil in the U. S. and Canada. The bark has a bitter, acrid and nauseous taste. It is a stimulant, aseptic and alterative; in large doses it is irritant, emetic and cathartic. It is employed in fevers, dysentery, scarlatina etc.; also as a local application in the form of poultice or ointment. A fluid extract is prepared; dose $\frac{1}{3}$ to 1 Cc. (5 to 15 minims).

Baptisin. The active principle of this drug is supposed to be represented under this name. A dose is from $\frac{1}{4}$ to $\frac{1}{3}$ grain.

This principle gained some notoriety from its alleged use some years ago as an ingredient of Listerine.

BDELLIUM. Indian Myrrh.

A gum-resin obtained from *Amyris Commiphora*, growing in Africa and the East Indies.

This gum comes to the market in small, reddish, semi-transparent, brittle, roundish pieces. It has a wax-like fracture and an odor resembling myrrh. Its properties are similar to myrrh.

BEBERU CORTEX. Bebeeru Bark.

The bark of the greenheart or sipiri tree, *Nectandra rodiaei*, Hooker (Fam. Lauraceæ).

This tree is a native of Guiana and neighboring parts of South America. The bark is ferbifuge and antiperiodic, and is chiefly used for preparing berberine sulphate which represents its medicinal properties. This alkaloid salt is similar to Berberine obtained from the barberry bark.

A fluid extract is prepared, dose $\frac{2}{3}$ to 2 Cc. (10 to 30 minims).

BELÆ FRUCTUS. Bael Fruit. Indian Bael.

The fruit of *Ægle Marmelos*, Correa (Fam. Rutaceæ).

The tree upon which this fruit grows is a native of India; the fruit is about the size of a large orange, has an aromatic flavor and is highly esteemed in that country for its refreshing and astringent properties, for which it is used in dysentery.

The dried half ripe fruit was formerly official in the Br. P. and is now official in the Indian and Colonial Addendum. It is used for the preparation of extractum Belæ Liquidum (1 in 1).

The dose of the liquid extract is from 2 to 4 Cc. (30 to 60 minims) or more.

BELLADONNA.

"The dried leaves of *Atropa Belladonna*, Linné (Fam. Solanaceæ)." <U. S.

"The dried leaves and branches of *Atropa Belladonna*, Linn., collected when the plant is in flower." <Br.

Extract of belladonna leaves is made from the dried leaves, tincture of belladonna leaves is made from the dried leaves, U. S., and green extract of belladonna from the fresh leaves, Br.

Belladonna Radix.—"Belladonna Root, U. S., Br. (Fam. Solanaceæ)." <U. S.

"The root of *Atropa Belladonna*, Linn.; collected in the autumn and dried." <Br.

This is used for making fluid extract of belladonna and tincture of belladonna, U. S., and liquid extract of belladonna and other preparations, Br., and other pharmacopœias.

The plant and its preparations are extensively used in medicine, both internally and externally.

Atropine is the principle alkaloid of belladonna. See Part II.

BENZOINUM. U. S., Br. Benzoin.

"A balsamic resin obtained from *Styrax Benzoin*, Drylander; and another unidentified species of *Styrax* (Fam. *Styracææ*). "<U. S. (Br. very similar).

This is commercially called "Gum Benzoin" and in commerce two principal varieties are known. Siam benzoin and Sumatra benzoin, the former having a vanilla-like odor and the latter a storax odor; but both yielding benzoic acid which is the chief medicinal constituent of the drug. See, also, *Balsams*.

Average dose of powder.—1 gm. (15 grains).

A tincture and a compound tincture are official in the U. S. See Part II.

Benzoin. The name "benzoin" is given to an aromatic shrub known as "Spice-bush" in northern U. S. and Canada. This bush has a spicy bark and fruit resembling the taste of spice, and is used in domestic medicine in the form of a decoction, spice-bush tea, and as an aromatic, stimulant and, diaphoretic for fevers, lung disorders, rheumatism etc. A fluid extract is prepared, dose 2 to 4 gm. (15 to 60 grains).

BERBERIS. U. S.

"The rhizome and roots of *Berberis Aquifolium*, Pursh.; and other species of *Berberis* (Fam. *Berberidacææ*). "<U. S.

The variety of *Berberis* official in the U. S. P. is known as "Oregon Grape Root." The root is found in the market in pieces of about a foot long and from one-fourth to an inch in thickness, but it is generally furnished to the trade in granulated or powdered form.

Average dose.—2 gm. (30 grains).

In the Ind. and Colonial Addendum to the Br. P., a species by the same name is described, which is grown in India and Ceylon. It is known in India as "Dárlahad," and is chiefly obtained from the Nepal barberry, *berberis aristata*. Its uses are the same as the U. S. drug. *Berberis* is a pure bitter tonic and stomachic employed for dyspepsia and as a general tonic for the system, useful as an alternative, laxative and diuretic. A fluid extract is official in the U. S. P. It is an ingredient in many bitters and compound medicines recommended for syphilitic and scrofulous affections and skin diseases of the scaly type.

***Berberis vulgaris*.** Barberry. Native of Europe and western Asia. The bark of the root is a bitter tonic; in large doses cathartic and antiperiodic. Useful in dyspepsia, jaundice and enlarged spleen.

A fluid extract is prepared, dose 4 to 8 Cc. (1 to 2 fl.drachms).

Berberine. The active principle of *Berberis*. Dose 2 to 5 grains. See Part II.

BETONICA. Wood Betony.

The plant, *Betonica officinalis* (Fam. *Labiataæ*), grown in Europe.

The whole plant is used as medicine, but the root has stronger properties. The whole plant is aromatic and astringent, but the root is emetic and purgative in large doses. The plant is employed in medicine as an alternative and tonic, in dyspepsia, chronic rheumatism, scrofula and blood disorders. A fluid extract is prepared, dose from 1 to 4 Cc. (15 to 60 minims).

BIDENS BIPINNATA. Spanish Needles.

The dried plant *Bidens bipinnata*, (Fam. *Compositæ*, *senecionidææ*).

This plant which is found chiefly in the arid deserts of Arizona has an herbaceous acrid taste and a disagreeable odor. It is employed in medicine as a stimulant, diaphoretic and emmenagogue, with especial reference to the laryngeal and bronchial passages. A fluid extract is prepared; dose from 1 to 4 Cc. (15 to 60 minims).

BISTORT. Snakeweed.

The dried root of *Polygonum bistorta*, an herbaceous perennial found in northern Europe.

This root has a rough taste because of its astringency, but has no characteristic odor. In medicine it is employed chiefly as a tonic astringent in diar-

rhœas and chronic dysentery. Dose of powdered root, 1 to 2 gm. (15 to 30 grains).

BLATTA ORIENTALIS. Russian Cockroach.

Official in the Ger. S.

These insects in the form of powder are said to be actively diuretic, and are recommended for dropsy. Dose of powder, 10 to 15 grains.

Taracatin or Antihydropin. A crystalline principle obtained from this drug is said to represent its activity.

BOLDO.

The leaves of a small evergreen shrub, *Peumus Boldus*. *Boldus fragrans*, found in Chili. It yields a volatile oil, and an alkaloid having a hypnotic and narcotic action, and quieting delirium and insanity. A fluid extract is prepared; dose from 1 to 5 drops; recommended for catarrh of the bladder, and gonorrhœa; also for hepatic inactivity.

Boldine. An alkaloid prepared from boldo and representing its activity.

Boldo-glucin. A glucoside obtained from boldo having similar properties as the alkaloid boldine.

BORAGO. Borage.

The plant *Borago officinalis*, (Fam. Boraginaceæ).

This plant is native of Europe, having a branching, erect stem from 1 to 2 feet high, and a white fleshy root. The fresh plant has a cucumber-like odor and a saline taste. It is used in medicine as an emollient, diaphoretic and refrigerant in fevers and pulmonary catarrh. A fluid extract is prepared; dose 4 gm. (1 fl.drachm).

BRYONIA. U. S. Bryonia (Bryony).

"The root of *Bryonia Alba* and of *Bryonia Dioica*, Linné (Nat. ord. Cucurbitaceæ)." <U. S. 7th revision.

The white bryony is a climbing, herbaceous plant, indigenous to some parts of Europe. The root of this and *B. dioica* are used in medicine as a purgative. The berries are also employed for the same purpose. A tincture was official in the U. S. P. and the fluid extract is furnished by manufacturers. A homeopathic tincture made from the fresh root is in good repute.

The dose of the powdered root is from 20 to 60 grains.

Bryonin. $C_{48}H_{80}O_{10}$. The chief principle of the plant is obtained by mixing the powdered root with $\frac{1}{10}$ its weight of powdered animal charcoal and percolating with strong alcohol until exhausted, then filtering the tincture through powdered animal charcoal, evaporating the solution and crystallizing. This is an active purgative in doses of 2 grains.

BUCHU. U. S. Buchu.

Buchu Folia. Br. Buchu Leaves.

"The dried leaves of *Barosma* (Thunberg), Bartling et Wendland (Fam. Rutaceæ)." <U. S.

The leaves are gathered by the Hottentots and imported in bales to this country and Europe. Both the long and the short leaves are used in medicine in making several pharmacopœial preparations, the fluid extract and tincture being extensively prescribed by physicians for catarrhal conditions of the kidneys and bladder, and for urinary troubles in general.

A fluid extract is prepared with $\frac{2}{3}$ alcohol, dose 1 to 2 Cc. (15 to 30 minims).

Several compound fluid extracts of Buchu are prepared. See Part II.

Barosmin. A concentrate prepared from Buchu. Dose 1 to 3 grains.

BULBI. Bulbs.

The bulbs of several plants of the Liliaceæ order are employed as medicine and are official in various countries.

Bulbus Alii. Garlic. "The bulb of *Allium Sativum*, Linné (Nat. ord. Liliaceæ)." <U. S. 7th revision.

This plant is employed in making several kinds of medicine, especially in the countries of southern Europe. In the U. S. syrup of garlic was official. A volatile oil may be obtained from the plant by distillation. It is very pungent and acrid. Garlic is considerably used as an ingredient of relishes, as French mustard etc., and as a seasoning for some kinds of sausage.

Bulbus Cepæ. The common onion. Cebolla, Sp.; Cebola, Port.; Oignon Commun, Fr. This is official under these names in these countries.

Bulbus Colchici. Colchicum. Colchici Cormus, Br.; Colchici Radix, U. S. (Which see).

Bulbus Lilii. Lily Bulb. Lis blanc, bulb, Fr.; Azucena bulbo, Sp.; The bulb of *Lilium Candidum*.

Bulbus Scillæ. Squill. Official in most countries. (See Scilla).

BUTEA. *Butea Frondosa*.

The "Dhak Tree" of India yields a juice from incisions in its stem which hardens quickly into small brittle tears or irregular fragments. This is called Butea gum or Bengal Kino, and is used as an astringent the same as Eucalyptus kino or the true gum kino; it is naturally tonic and astringent like gums of this kind.

The seeds of *Butea frondosa* from the same trees are official in the Ind. and Col. Addendum, and are employed as an equivalent of Santonin for the removal of worms. The seeds should be administered in the form of powder.

BUXUS. Box.

The wood and leaves of *Buxus sempervirens* (Fam. Euphorbiaceæ).

Box is a small ornamental plant used chiefly for hedges or borders of walks. The leaves have a disagreeable taste and a peculiar odor. The wood may be used in decoction as a diaphoretic and the leaves as purgative. An oil distilled from the plant is useful for epilepsy, the dose is from 2 to 6 drops.

Buxin. This is a principle obtained from the box tree by extracting the leaves with alcohol, concentrating the tincture and precipitating. The dose is from 2 to 6 grains.

CACTUS GRANDIFLORA. Night-blooming Cereus.

A succulent shrub of the cactus family, native of tropical America, remarkable for the size and beauty of its flowers, which open only at night. The fleshy green stem, upon which are several radiating spines, is cut fine and macerated with four times its weight of strong alcohol, producing a tincture, which is highly recommended as a heart tonic.

A fluid extract is also prepared, (1 to 1).

Average dose of the tincture, 30 minims, and of the fluid extract, 5 to 10 minims, every four hours. These preparations are used as heart stimulants and for dropsy.

Cactine. This is claimed to be an alkaloid obtained from the plant and used for the same purposes as the liquid preparations, dose $\frac{1}{4}$ to $\frac{1}{2}$ grain.

Cereus bonplandii and **Cereus McDonaldia**, varieties of cactus found in Mexico are similar to *Cactus Grandiflora* in medicinal use and action.

CAFFEA. Coffee. Semen Coffeæ.

The seed of the coffee plant, *Coffea Arabica*, Linné.

This is commonly called "Coffee," and the name applies not only to the natural seed but the seed or "berry" after it has been roasted or browned, in which form it is most common in the retail market. The tree is a native of southern Arabia and Abyssinia; but has been domesticated in most warm countries that are abundantly supplied with moisture. It requires frequent rains and a tropical, or at least a semi-tropical climate for its culture. The medicinal activity of coffee depends upon its percentage of caffeine, its principal alkaloid, and this varies considerably with the varieties and the localities from which they are obtained.

Coffee is an exhilarant and cerebral stimulant, and although commonly used as a beverage it is seldom used as medicine except in its alkaloid, caffeine. Roasted coffee, however, is used as a deodorizer with some disagreeably smelling drugs, and in the form of extract and syrup is used at soda fountains and for flavoring, in various combinations.

Fluid extracts are prepared both from the green and the roasted berries. The green berry fluid extract is chiefly valuable for the caffeine it contains; but the fluid extract from the roasted berries is used as a flavoring and for making syrup for soda water. Dose of either fluid extract 30 to 90 minims.

Caffeine. This is the principal alkaloid of coffee, tea and coca, in all of which, under different names, it is identical. As it is official it will be noticed under the title Caffeine in Part. II.

CALAMUS. U. S. Sweet Flag.

"The unpeeled, dried rhizome of *Acorus Calamus*, Linné (Fam. Araceæ)." <U. S.

This plant grows throughout the U. S. in low, swampy places. The rhizome is strongly aromatic and pungent, making a pleasant addition to species, bitters and other medicines. A volatile oil is distilled from it which well represents its aromatic properties. A bitter principle named "acorin" is also obtained and an alkaloid called "calamine" which is insoluble in water and ether, but soluble in alcohol and chloroform.

This is given mainly as an aromatic stimulant and carminative. The fresh peeled root is simmered in syrup, the product being "candied sweet flag," which is a popular confection. A fluid extract is prepared for combining with liquid medicines. Average dose 1 gm. (15 grains).

CALENDULA. U. S.

"The dried ligulate florets of *Calendula officinalis*, Linné (Fam. Compositæ)." <U. S.

The florets of calendula are used in pharmacy for preparing a fluid extract and a tincture, similar to the fluid extract and tincture of arnica. The calendula preparations have similar properties and uses as arnica and are preferred by some practitioners who have had experience with both drugs. Calendula preparations are quite generally used externally but homeopathic physicians prescribe them for internal use, largely diluted.

A fluid extract is prepared with diluted alcohol, dose 1 to 5 Cc. (15 to 75 minims). Also used externally.

CALISAYA. Yellow Calisaya.

The dried bark of *Cinchona Calisaya*, Wedell (Fam. Rubiaceæ). <U. S.

This is included in the U. S. P. under the title "Cinchona" as a variety of bark. In several foreign pharmacopœias it is known as **Cortex Chinæ Calisaya**, distinguishing it from other varieties. Its medicinal properties and doses are similar to other varieties named under the title Cinchona, which see. Several proprietary tonics, bitters and semi-proprietary elixirs etc., have been advertised under the name of "Calisaya" so that it has come to be popularly known as different from Cinchona.

CALUMBA. U. S.

Calumba Radix. Br. Calumba Root.

"The dried root of *Jateorhiza palmata*, (Lamark), Miers (Fam. Menispermaceæ)." <U. S.

"The dried transversely cut slices of the root of *Jateorhiza Calumba*, Miers." <Br.

This root which is commonly known as "Colombo root," is found in the market in transverse slices, usually attached by a string through the center, but may be had in other forms, as granulated for percolation or powdered.

It is a pure bitter used in medicine as a stomachic and tonic to the digestive

tract, and as an ingredient in bitters and tonics. It contains several principles which may be isolated, but are seldom employed in medicine. A fluid extract and tincture are official.

Average dose.—2 gm. (30 grains).

CAMBOGIA. U. S., Br.

"The gum-resin obtained from *Garcinia Hanburii*, Hooker fil. (Fam. Guttiferae)." <U. S., Br.

This gum-resin is obtained by making incisions in the bark or by breaking off the leaves and shoots of gamboge-producing trees, of which there are several varieties in Ceylon, Siam and Cochin-China. A juice exudes from the incisions or broken shoots which concretes or solidifies to drops upon exposure to air and are generally known in continental Europe as **gummi gutta**. The official title was probably chosen because the gum-resin mostly came from Cambodia; it is chiefly imported from Canton and Calcutta to which ports it is brought from the interior.

In the market gamboge occurs chiefly in cylindrical rolls from one to three inches in diameter, this is called pipe gamboge. Another variety in the form of mass called cake gamboge is frequently met with. Druggists quite generally get it in powder as in that form it is most convenient for making pill mass which is its chief medicinal use. It is a powerful hydragogue cathartic and is chiefly used medicinally in combination with corrigants which mitigate its action. It is also used for making water-color paints.

Average dose.—0.125 gm.=125 milligrammes (2 grains).

CAMPHORA. U. S., Br. Camphor.

$C_{10}H_{16}O$. = 150.98.

The dextrogyrate modification of the saturated keytone ($C_9H_{16}CO$), obtained from *Cinnamomum Camphora* (Linné), Nees et Ebermaier (Fam. Lauraceæ); and purified by sublimation." <U. S.

"A white crystalline substance obtained from *Cinnamomum Camphora*, purified by sublimation." <Br.

Camphor is obtained from chips of camphor wood and root, together with twigs from the branches. These are placed in a 'crude' reservoir and steam generated from water underneath them, which passes through holes in the bottom of the reservoir and thus conveys the volatilized camphor together with oil of camphor into earthen pots inverted on the top of the reservoir, in which the camphor is sublimed. The crude camphor thus produced is drained or pressed to free it from the oil of camphor and the camphor is purified by sublimation. Camphor is used in all countries.

When treated with acids it produces several acids, as camphoric acid, $C_{10}H_{16}O_4$, camphoronic acid, $C_9H_{12}O_5$ etc.

Crude camphor is prepared chiefly in China and Japan, from whence it is imported and refined in the U. S., Great Britain and other European countries. The camphor tree grows very large in its native countries, and trees of fair size are found in southern California where they are used as shade trees. Since the discovery of celluloid, of which it is an ingredient, the use of camphor has very greatly increased.

Artificial Camphor. This is now prepared but so far its production on a commercial basis has not proven profitable. It will be further mentioned under Camphora in Part II.

CANELLA: Canella Cortex. Canella Bark.

The bark of *Canella alba*, Murray; deprived of its corky layer and dried.

Under the title *Cortex Canellæ alba*, this is official in several European countries. The tree is native in Florida, the West India islands, and the Bahamas, from which the chief supply is derived. It is known there as white wood bark or white cinnamon. In medicine it is employed as an aromatic addition to bitter tonics and digestives. With aloes in powder it is an ingredient of the old domestic remedy "Picra."

A fluid extract is prepared, dose from 10 to 40 minims.

CANNABIS INDICA. U. S., Br. Indian Cannabis. Indian Hemp.

"The dried flowering tops of the pistillate plants of *Cannabis Sativa*, Linné (Fam. Moraceæ), grown in the East Indies." <U. S.

"The dried flowering or fruiting tops of the female plant of *Cannabis Sativa*, Linn, grown in India, from which the resin has not been removed." <Br.

This is obtained in northern India, and is also cultivated in Europe and America. In Persia and Hindoostan it is used as an intoxicant and is found in the bazaars under the name "Gunjah" or "Hashish." A resinous exudate appears upon the green plant and natives dressed in leather breeches run through the fields, the resin collecting upon the leather from which it is scraped and gathered into balls which are called "churru."

The plant is narcotic, causing peculiar sensations and hallucinations. It is employed in medicine as a nervine, anodyne and hypnotic. Average dose 0.065 gm. = 65 milligrammes (1 grain). A fluid extract, extract and tincture are prepared from the plant.

Cannabin. A neutral principle obtained from the plant, and used in medicine for the same purpose as the drug.

Cannabine. This is claimed to be an alkaloid and is also prepared from the drug. It is official in the Ger. S.

Cannabine Tannate. This is official in several countries of Europe. The dose of the principle and alkaloid is $\frac{1}{2}$ to 1 grain or more.

CANTHARIS. U. S., Br. Cantharides. [Spanish Flies].

"The beetle, *Cantharis vesicatoria*, (Linné), De Geer; thoroughly dried at a temperature not exceeding 40°C. (104°F.)." <U. S.

"The dried beetle, *Cantharis vesicatoria*, Latr." <Br.

These beetles are obtained chiefly from Spain, Italy, southern France and southern Russia, the latter variety being preferred. They feed upon the leaves of trees and shrubs, preferably the white poplar, ash, elder and lilac, and are obtained early in the morning when they are chilled, by beating the trees or shrubs with poles and collecting them from sheets upon which they fall. They are then exposed in a covered sieve to the fumes of boiling vinegar which kills them, and are dried in the sun or by artificial heat which should not be over 40°C. (104°F.).

The beetles or flies are employed in medicine chiefly for producing irritation of the skin and vesications or blisters. The tincture is employed internally as an aphrodisiac and for dropsy and amenorrhœa, and externally in hair tonics to stimulate the hair bulbs. The powdered flies are prepared with lard and beeswax into a cerate for blistering. Alcoholic or ethereal tincture is also prepared for the same purpose.

Average dose. 0.030 gm. = 30 milligrammes ($\frac{1}{2}$ grain).

Cantharadin or Cantharidine. This is a crystalline substance obtained from cantharides, and is the vesicating principle of the insect. According to the Fr. Codex it is prepared by exhausting the powdered cantharides first with chloroform to dissolve out the cantharidine, then distilling the chloroformic extract, mixing it with carbon disulphide, which dissolves out the greasy matter without dissolving the cantharidine, then pouring off and dissolving the residue with chloroform, evaporating and crystallizing.

CAOUTCHOUC. Br. India-rubber.

Elastica. U. S. Rubber.

This appears under the above different headings in the Br. and U. S.

"The prepared milk-juice of *Hevea brasiliensis*, Muell., Arg., and probably other species, known in commerce as pure Para rubber." <Br.

"The prepared milk-juice of several species of *Hevea*, Aublet (Fam. Euphorbiaceæ); known in commerce as Para rubber." <U. S. See Elastica.

CAPSELLA BURSA PASTORIS. Shepherd's Purse.

A common pasture weed of the family Cruciferae.

It has a pungent, bitter taste and, by distillation yields an oil similar to essential oil of mustard. It has some reputation as a domestic remedy,

being used in the form of decoction as a diuretic in dropsy and kidney complaints and as a stimulant and antiscorbutic. A fluid extract is prepared, dose 1 to 4 Cc. ($\frac{1}{4}$ to 1 fl.drachm).

CAPSICUM. U. S. Capsicum. Cayenne Pepper.

Capsici Fructus, Br. Capsicum.

"The dried ripe fruit of *Capsicum fastigiatum*, Blume (Fam. Solanaceæ)." <U. S.

"The dried ripe fruit of *Capsicum minimum*, Roxb." <Br.

The plant is a native of the East Indies, but is cultivated generally in tropical countries and a number of varieties are found in the market. *Capsicum baccatum*, or bird pepper, *C. frutescens*, and *C. fastigiatum* are shrubs, but *C. annum*, which is the chief cultivated variety, is an herb.

The fruit which is commonly known as "red pepper" is very pungent to the taste and irritating to the mucous membrane if it comes in contact with it.

It is extensively used as a seasoning for food, catsup, pickles etc., and is an ingredient in most of the liquid sauces etc. that are used as relishes. Pepper-sauce is prepared by filling a bottle with red peppers or "bird peppers" and adding vinegar. Tobasco sauce is the quintessence of the red fruit.

The drug is mostly used in the drug business in the form of powder, and from it the official tincture and oleo-resin are prepared, also a fluid extract which is not official.

The tincture of capsicum is used in liniments externally in various medicinal compounds. The oleo-resin is used in capsicum plasters, pills etc.

Average dose.—0.065 gm.=65 milligrammes (1 grain).

CARDAMOMUM. U. S. Cardamom.

Cardamomi Semina. Br. Cardamom Seeds.

"The dried, nearly ripe fruit of *Elettaria repens* (Sonnérat), Baillon (Fam. Zingiberaceæ)." <U. S.

"The dried ripe seeds of *Elettaria Cardamomum*, Maton." <Br.

Several varieties of cardamoms are obtained from Malabar and adjacent countries. They are known in the market as lesser, medium and larger cardamoms, the "lesser" variety being generally used in pharmacy. A volatile oil possessing its aromatic properties is distilled from it. Cardamom is used as an aromatic and flavoring for many preparations, as powders, tinctures, elixirs etc. Average dose.—1 gm. (15 grains).

A fluid extract is prepared, dose $\frac{1}{3}$ to 1 Cc. (5 to 15 minims).

A compound fluid extract of Cardamom is prepared from Cardamom and Cinnamon each 7 oz., Caraway $3\frac{1}{2}$ oz., Cochineal $1\frac{3}{4}$ oz., with alcohol to make 16 fl.ounces. This is used mainly for flavoring medicines.

CAROTA. Wild Carrot.

The fruit or seed of *Daucus Carota*, a biennial plant growing in dry fields in Europe and the U. S. It is slightly aromatic and has a pungent taste. In medicine it is used as a diuretic and stimulant, especially in ordinary dropsy. It is also employed externally or locally in the form of infusion, for itching or pruritus. Its active properties are extracted by hot water, but a fluid extract is prepared which is more generally used by physicians.

CARTHAMUS. American Saffron.

The long tubular flowerets of *Carthamus tinctoria*, yellow when first gathered but drying to a dark brownish-red.

These flowerets are commonly sold in the U. S. for Saffron, although they are entirely different from the true Saffron, which is the stigmas of *Crocus sativus*, grown in Europe. They have a faintly insipid bitterish taste and a rather peculiar odor. In medicine the drug is of but little value, but has slight action as a diuretic, diaphoretic and laxative. It is chiefly used in species, and in the form of infusion, saffron tea is given to newly-born babies to clear their complexion.

A pigment for coloring the cheeks, sold in the form of "pink saucers," is made from this drug.

CARUM. U. S. Caraway. Carui Fructus. Br. Caraway Fruit.

"The dried fruit of *Carum Carvi*, Linné (Fam. Umbelliferae)." <U. S.

"The dried fruit of *Carum Carvi*, Linn." <Br.

The caraway seed of the pharmacopœias is a native of Europe and is cultivated in gardens or dooryards in the U. S. It is aromatic, and is used chiefly for that property, as an addition to species or to liquors or medicinal compounds. A volatile oil is distilled from the fruit or plant, and a liquor known as **Kümmel** is prepared from it by distillation with spirits.

Average dose.—1 gm. (15 grains).

A fluid extract is prepared with alcohol, dose 1 to 2 Cc. (15 to 30 minims). Used chiefly as flavoring for medicines.

Carvol is the chief constituent of oil of caraway. (Which see).

CARYA ALBA. Shell-bark Hickory.

The common hickory of the United States (Fam. Juglandaceæ).

The leaves are somewhat aromatic and astringent. The bark has similar properties. An extract is prepared from the bark, which is used to give the flavor of maple syrup or sugar, being known as maple flavor. The nuts yield an oil known as hickory-nut oil which is esteemed.

A fluid extract is prepared from the inner bark which represents the medicinal properties of the tree, as tonic and antiperiodic.

Dose 2 to 4 Cc. (½ to 1 fl.drachm).

CARYOPHYLLUS. U. S. Cloves.

Caryophyllum. Br. Cloves.

"The dried flower-buds of *Eugenia aromatica*, Linné; *O. Kuntze* (Fam. Myrtaceæ)." <U. S.

"The dried flower-buds of *Eugenia Caryophyllata*, Thumb." <Br.

Cloves are obtained from small trees growing in the Molucca Islands, and in the West Indies. They are warm, aromatic and stimulant, and are considerably used in medicinal preparations as a flavoring and for their carminative effect. Their chief value is contained in a volatile oil which may be obtained from them by distillation. This consists chiefly of **Eugenol**, which is a methyl ether of allyl-dioxybenzene.

Average dose.—0.250 gm. = 250 milligrammes (4 grains).

A fluid extract is prepared with alcohol, dose ½ to 2 Cc. (8 to 30 minims). Used chiefly for flavoring other medicines.

Caryophyllin, $C_{26}H_{32}O_2$, is a principle obtained from cloves by exhausting them with ether and precipitating the extract with water. A white substance is precipitated which is treated with ammonia to remove its impurities.

Caryophyllic Acid, $C_{26}H_{32}O_6$, is prepared from caryophyllin by treating it with fuming nitric acid.

CASCARA SAGRADA. Br.

Rhamnus Purshiana Cortex. Sacred Bark.

"The dried bark of *Rhamnus purshiana*, DC." <Br.

In the U. S. P. this is known as "*Rhamnus Purshiana*" under which title it is described.

Cascara Amarga. Honduras Bark. The bark of a Mexican tree, (Fam. Simarubaceæ). An alterative tonic and anti-syphilitic. Should not be confounded with *Cascara Sagrada* which is entirely different.

A fluid extract is prepared, dose 2 to 4 Cc. (½ to 1 fl.drachm).

A liquid extract is official in the Br., dose ½ to 1 fl.drachm.

Picramnine. An alkaloid obtained from *Cascara amarga*, dose 1 to 5 grains.

CASCARILLA. Br. Cascarilla.

"The dried bark of *Croton Eluteria*, J. J. Bennett." <Br.

This was official in the U. S. P. 7th revision but was dismissed in the 8th. The bark is obtained chiefly from the Bahama Islands and Cuba; but a Mexican variety is somewhat used in that country.

It is a bitter aromatic, having a spicy taste and when burned, a musk-like odor. It is considerably used in making aromatic bitters, and is burned with gums and is an ingredient of aromatic or medicinal pastilles. A volatile oil is distilled from it, and a bitter principle, **Cascarillin**, is obtained by precipitating a concentrated tincture with lead acetate etc., as is common in obtaining neutral principles of plants.

A fluid extract is prepared with $\frac{3}{4}$ alcohol, dose 1 to 5 Cc. (15 to 75 minims).

Cascarilline, which is supposed to be an alkaloid is also obtained from the bark.

CASSIA FISTULA. U. S.

"The dried fruit of *Cassia Fistula*, Linné (Fam. Leguminosæ)." <U. S.

The pods of this plant are from 18 inches to 24 inches long and from $\frac{3}{4}$ inch to 1 inch in diameter. They are nearly cylindrical in shape, blackish-brown in color, and very hard.

In the interior they are divided into numerous cells, each containing a smooth flattish-oval, reddish-brown seed, surrounded by pulp. The pulp only is used in medicine.

Average dose.—4 gm. (60 grains).

CASSIÆ PULPA. Cassia Pulp. Br.

"The pulp obtained from the pods of *Cassia Fistula*, Linn." <Br.

The pulp is viscid and nearly black, with a faint odor resembling prunes and having a mawkish, sweet taste. The pods yield about thirty percent. of this pulp which is used in pharmacy in the preparation of confection of senna and in making laxative confections.

CASTANEA. Chestnut.

The common chestnut, *Castanea vulgaris*, Lamark; var. *Americana* (Fam. Cupuliferæ).

A large tree common in North America, yielding "chestnuts," a popular nut, in the fall and early winter.

The leaves are an efficient remedy for whooping cough. In domestic medicine they are employed in the form of infusion (probably better than in any other way). A fluid extract is prepared, dose $\frac{1}{3}$ to 4 Cc. (5 to 60 minims).

CASTOREUM. Castor. Beaver Castor.

The dried preputial follicles, and their secretion, known as Castor fiber, obtained from the Beaver, chiefly from Canada and Russia. It has a peculiar odor and a bitter, acrid, nauseating taste. It is stimulant and antispasmodic, and is reputed to cure "fits," hysteria and chorea.

A tincture is prepared with alcohol, and an ammoniated and ethereal tincture are used in European pharmacy.

CATARIA. Catnep.

The tops and leaves of *Nepeta Cataria*, Linné (Fam. Labiatæ).

This plant is common in Europe and America in waste open places by the sides of buildings and fences. It has a strong peculiar odor, pungent, aromatic, rather bitterish taste, and contains a volatile oil which may be separated by distillation.

In medicine it is employed for hastening retarded menses and for the relief of flatulent colic in infants, also acting as a nervine. In the form of infusion "Catnep tea" is a popular domestic remedy, and may be advantageously employed as a diaphoretic, tonic, stimulant, and emmenagogue. Cats are specially fond of catnep.

A fluid extract is prepared, dose 4 to 8 gm. (1 to 2 fl.drachms), best given in hot water.

CAULOPHYLLUM. Blue Cohosh.

Squaw root. Blueberry root. Pappoose root.

The root-stalk and rootlets of *Caulophyllum thalictroides*, Michx. (Fam. Berberidaceæ).

This plant is found in woods in Canada and the northern U. S. Its rootlets are very numerous, forming a dense mat about the root-stalk. The drug has an acrid odor and taste and leaves a sweetish persistent acrid taste after chewing it. It is a sedative, oxytocic and abortifacient and is used in amenorrhœa, hysteria and uterine displacements.

A fluid extract is prepared, dose $\frac{3}{4}$ to 2 Cc. (10 to 30 minims); it is also used in compound female remedies.

Caulophyllin. A concentrate prepared by pouring a concentrated alcoholic tincture into water, collecting and drying the precipitate; dose $\frac{1}{4}$ to 1 grain.

CEANOTHUS. Red Root.

The root of *Ceanothus Americanus* (Fam. Rhamnaceæ); commonly known as "Jersey Tea."

A small shrub found in woods and groves in U. S. and Canada, and quite abundant on barren lands in the West. It has astringent, expectorant and antispasmodic properties and is used for asthma, chronic bronchitis, catarrhal affections and in inflammations. Its decoction is popular as a domestic remedy for sore mouth or throat, canker, ulceration or morbid inflammation.

A fluid extract of the root is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm). A syrup of red root is also prepared.

During the American Revolution the leaves of this plant were used as tea by many, taking the place of the Chinese tea, made obnoxious by the British tax, for which reason it was destroyed in Boston Harbor.

CELASTRUS. Climbing Staff-tree. False Bittersweet.

The bark of the root of *Celastrus Scandens* (Fam. Celastraceæ).

This is a climbing shrub or vine found throughout the northern U. S. and Canada. It twines about trees and often reaches to a great height. The bark of the root which is intensely yellow is the part used. It is alterative, diaphoretic and diuretic, and is considered a valuable remedy for scrofulous conditions and cutaneous eruptions, also for female disorders and irregularities.

A fluid extract is prepared, dose 4 to 8 Cc. (1 to 2 fl.drachms).

An ointment is made by steeping the fresh bark in lard for some time until its strength is extracted. This is useful for scrofulous sores and ulcers and all manner of sores.

CENTAUREA. Blessed Thistle.

The leaves of *Centaurea Benedicta* (Fam. Cynareæ).

The herbaceous plant has long rough leaves, irregularly toothed and barbed with sharp spines. Its odor is unpleasant and the taste bitter. It is used in medicine as a tonic, particularly for gastric debility; large doses act as emetic.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

CENTAURY. European Centaury.

The flowering heads of European Centaury. It is diaphoretic and somewhat tonic and has a strong, bitter taste. It is used in dyspepsia and gastric fevers, but is more particularly an ingredient of the compound cordials and bitters prepared in Europe. In this country it is but little used but in Europe it is given in the form of hot infusion to break up colds and fevers.

CEPHALANTHUS. Button Bush.

The bark of the root of *Cephalanthus occidentalis* (Fam. Rubiaceæ).

This is a shrub found near marshes, rivers and small bodies of water in the U. S. and Canada. It is tonic, laxative and diuretic and is used for fevers and disorders of the bladder and urinary canal.

A fluid extract is prepared; dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

CERÆ — WAXES.

Wax is the general name for a variety of peculiar, concrete substances resembling beeswax. Although the varieties used are few, they are obtained from the animal, vegetable and mineral kingdoms, and serve important and useful purposes that could not well be supplied by other substances. In the arts beeswax is extensively used for modeling, making moulds, electrotyping, etching etc. In pharmacy it is used for making cerates, ointments and similar galenicals. Other varieties of wax are but little used in comparison with beeswax, but some of them are now being employed in place of it for some purposes, as they can be obtained at lower prices.

The following are the varieties of wax known and used in pharmacy, beeswax only being official:

CERA FLAVA. U. S., Br. Yellow Wax. Beeswax.

"A peculiar concrete substance prepared by *Apis Mellifica*, Linné." <U. S.

This is obtained by melting the honey-cells or honey-comb of the common honey-bee, *Apis Mellifica*, and is purified by straining and agitating with hot water while fluid. It is then poured into pans containing a little hot water, when most of the impurities subside and may be scraped from under the surface of the cake when cold.

Beeswax is composed of three different substances, namely, **Myricin**, **Ceratic Acid** and **Cerolein**. These substances may be separated by boiling wax in alcohol; the first remains undissolved; the second dissolves but crystallizes out upon cooling; the third remains in solution in cold alcohol.

Yellow wax is used in the arts for moulding etc., and in pharmacy for making some kinds of cerates and ointments, when the color is not objectionable. It is better in many respects for cerates etc. than white wax which is prepared from it.

CERA ALBA. U. S., Br. White Wax. White Beeswax.

White wax is beeswax bleached by exposing yellow wax in thin layers to the action of light, air and moisture. It is prepared in a commercial way by first melting yellow wax and making it into thin sheets which are spread upon linen cloths stretched upon frames, moistened occasionally and exposed to the light and air until the color is partly discharged. The wax is then gathered, melted and sheeted as before, and again bleached in the same manner, and the operation is continued until it is considered sufficiently white for the market, when it is melted and run into round or square cakes.

White wax is considerably used in the form of thin sheets for making wax flowers, and other artistic work. It may be sheeted for this purpose by melting upon water and plunging a round bottle in the melted mass. When withdrawn, a thin coating of wax adheres to the bottle, which, when cut, comes off in sheets. In pharmacy it is used in making the light colored cerates, and to give consistence to some of the white ointments.

Other Kinds of Natural Wax.

The following are varieties of wax obtained from natural sources:

Bay Wax, Myrtle Wax or **Bayberry Tallow**.—This is obtained from the fruit of the wax myrtle by boiling it in water, the wax or fat collecting upon the surface. It is greenish-yellow, has a balsamic odor, and is harder and more brittle than beeswax. It is sometimes used in ointments, and for making candles, from which the fruit is called **candleberry**.

Carnauba Wax.—Obtained from the leaves of the wax palm by boiling them in water and collecting the wax which rises to the surface. This wax is extensively used for the manufacture of candles, also for making varnish. It is not used in pharmacy.

Japan Wax.—A species of wax or turpentine obtained from the *Rhus Succedaneum* of Japan. It is used chiefly in making varnish and candles.

Ceresin or **Ozokerite**.—Mineral or Earth Wax.—This is a species of wax obtained from mineral deposits in various parts of the country, but chiefly obtained in Russia and Austria-Poland. It is found in the fissures of shale

or slate, from which it is obtained by fusion. When refined it so closely resembles yellow beeswax as to be readily sold for it, and may be used for the same purposes. It is now extensively used instead of yellow beeswax.

Paraffin Wax.—The solid white crystalline hydro-carbon obtained from petroleum by chilling it with ice, pouring off what remains liquid, and subjecting the remaining semi-solid mass to pressure, is called paraffin or paraffin wax. It somewhat resembles white wax which it sometimes substitutes or is used to adulterate. It varies considerably in hardness, according as more or less of the soft paraffin remains combined with it. It is used instead of beeswax for many purposes, and may be employed in making ointments and cerates, but is not so satisfactory as beeswax. It is used for making corks impervious to chemicals, for sealing bottles, covering jelly etc.

CETACEUM. U. S., Br. *Spermaceti*.

Spermaceti is a "peculiar concrete, fatty substance," obtained from the oleaginous matter found in the head of the sperm whale, *Physeter macrocephalus*. The oily matter from which *spermaceti* is obtained is found in a large cavity in the upper jaw, and is dipped out soon after the animal is dead, as an oily liquid which congeals into a yellow mass. This is drained in suitable bags, and then pressed with great force to remove the liquid olein, leaving the solid cetaceum in the bags. This is then purified by melting in water, straining, boiling with weak solution of potash, then washing with water, and finally allowing to congeal into a white crystalline mass, somewhat resembling wax. Its low melting point, 50°C. (122°F.), combined with its solidity when cold, makes it a valuable addition to many ointments and cerates, giving them a firm consistence, but allowing them to be readily worked or softened.

Spermaceti is employed in pharmacy to give consistence to ointments etc., and as an ingredient in several toilet preparations, Crèmes etc. It is also used to give a gloss to starch. In medicine it is frequently given to allay internal irritation. It may be powdered by fusing it and rubbing it in a mortar until cold. Mixed with three times its weight of sugar it is the **Saccharated Spermaceti** considerably prescribed in France and Germany.

CETRARIA. Iceland Moss.

"*Cetraria islandica* (Linné), *Ascharius* (class Lichenes)." <U. S. 7th revision.

This lichen which is obtained from rocks in Iceland, northern Canada and New England, is used in pharmacy chiefly for making jellies, either for nutritious food or as a vehicle for medicines. It has had considerable reputation as a remedy for pulmonary affections, and Iceland moss cough syrups or tablets are favorite medicines, although they seldom contain any Iceland moss. It contains some tonic principles, but is chiefly used as a demulcent. When used it should first be soaked in water several times, the water being poured off each time, to deprive it of its bitterness.

CHELIDONIUM. Celandine.

"The entire plant *Chelidonium majus*, Linné (Nat. ord. Papaveraceæ)." <U. S. 7th revision.

This is a common, wild, perennial, herbaceous plant, having purgative and diuretic properties, and used considerable as a domestic remedy for jaundice and scrofulous eruptions.

The dose of the dried root is 30 to 60 grains.

A fluid extract is prepared with $\frac{2}{3}$ alcohol, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

Chelidonic Acid has been obtained from it and a number of other principles and bodies possessing acrid properties and said to be similar, if not identical to those obtained from sanguinaria.

CHELONE. Balmony. Snake-head.

The stems and leaves of *Chelone glabra*, (Fam. Scrophulariaceæ). North America. An herb growing in moist places and having large white or purple flowers, which from their resemblance to the head of a reptile have given the

plant the name, snake-head, turtle-head, shell-flower. It is purgative, tonic and anthelmintic. Useful in constipation, jaundice etc.

A fluid extract is prepared with diluted alcohol, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

Chelonin. A principle prepared from Chelone, dose 1 to 3 grains.

CHENOPODIUM. Wormseed. American Wormseed.

Formerly official in the U. S. but has been dismissed. The fruits (seeds) of *Chenopodium ambrosioides*, Linné (Fam. Chenopodiaceæ). Native of North America and Europe, also found in the West Indies, Central and South America. Very small seeds, peculiar, nauseous, pungent taste. Medicinal principle chiefly in the oil. Anthelmintic and antispasmodic. Wormseed tea is prepared by pouring boiling water upon the seeds.

A fluid extract is prepared with alcohol, dose 1 to 5 Cc. (15 to 75 minims).

Oil of *Chenopodium* is obtained by distillation, dose 4 to 8 minims.

CHIMAPHILA. U. S. Pipsissewa. Prince's Pine.

The leaves of *Chimaphila umbellata* (Linné), Nuttall (Fam. Ericaceæ)."
<U. S.

This is a small evergreen, semi-procumbent plant, native of the northern U. S., Europe and Asia; from its shining persistent leaves it is called winter-green. It is astringent, slightly bitter, with a sweetish taste and marked diuretic properties. It has been used effectively in dropsy, and is reputed to be a cure for boils and similar eruptions. A fluid extract is prepared and a principle obtained from the plant called **chimaphilin**, which has properties similar to preparations of the plant. It may be obtained in yellow crystals insoluble in water but soluble in alcohol, chloroform and ether.

Average dose of the powdered leaves 2 gm. (30 grains), but the fluid extract is generally given, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

Arbutin. This is a neutral colorless crystalline principle obtained from *Chimiphila*, also found in *Uva Ursi* and other similar drugs. Dose 3 to 5 grains.

Chimaphilin. The active principle of *Chimaphila*, dose 1 to 4 grains.

CHIONANTHUS. Fringe Tree.

The bark of the root of *Chionanthus Virginica*, Linné (Fam. Oleaceæ).

This is an ornamental shrub or small tree found in woods from southern Penn. to Florida, and west to Kentucky and Tenn. The bark of the root is aperient, alterative and diuretic, used as a tonic and laxative and for biliousness and intermittent fevers.

A fluid extract is prepared; dose 1 to 4 Cc. ($\frac{1}{4}$ to 1 fl.drachm).

CHIRATA. U. S., Br. Chirata, U. S. Chiretta, Br.

"The dried plant *Swertia Chirayita*, Hamilton (Fam. Gentianaceæ)."
<U. S.

"The dried plant *Swertia Chirata*, Ham., collected when in flower." <Br.

This plant is a native of northern India and has long been used in that country in the preparation of bitters and tonics for dyspepsia and debility. It is like gentian, a true bitter, having no other marked medicinal properties. It is used for the same purposes as gentian and columbo.

Average dose of the powdered plant is 1 gm. (15 grains). A fluid extract and tincture are also official in the U. S. P.

Chiratin. $C_{26}H_{48}O_{13}$. A principle obtained from this plant seems to represent its chief medicinal value, but it also contains

Ophelic Acid, $C_{13}H_{20}O_{10}$, which has the properties of other bitter vegetable acids.

CHONDRUS. U. S. Carrageen. Irish Moss.

"The dried plant of *Chondrus crispus* (Linné) Lyngbye (Fam. Gigartinaceæ)."
<U. S.

A plant found upon the stones and rocks on the coast of Europe and mostly obtained from the western coast of Ireland. It is also found along the south-

ern coast of Massachusetts, from which the U. S. supply is now chiefly gathered.

It forms mucilaginous jelly when boiled for 10 or 15 minutes, which is highly esteemed as a nutritious food, and in pharmacy it is employed for making emulsions and is said to be much used in making some of the popular cod-liver oil emulsions, sold as proprietary medicines. Some principles have been obtained from it similar to those obtained from gum Arabic, and a substance may be made from the mucilage obtained from it by evaporation, which considerably resembles gum Arabic but lacks its adhesive qualities. In mucilage it is used in pectoral complaints, scrofula, and in irritability of the digestive tract.

CHRISAROBINUM. U. S., Br. Chrysarobin.

"A neutral principle extracted from goa powder, a substance found deposited in the wood of *Vouacapoua Araroba*, Aguiar (Fam. Leguminosæ)."
<U. S.

"A substance obtained from Araroba by extracting with hot chloroform, evaporating to dryness and powdering. It consists chiefly of a definite chemical substance, also known as chrysarobin but contains a varying proportion of chrysophanic acid." <Br.

The difference between chrysarobin and goa powder or araroba which is recognized in the Br. P. is that the former is purified. In the Br. P. both the crude and the purified are given.

Araroba. Br. Goa Powder. Chrysarobin.

"A substance found in cavities in the trunk of *Andira Araroba*, Aguiar; freed as much as possible from fragments of wood, dried and powdered." <Br.

This is a yellowish-brownish or brown powder obtained in Brazil, and considerably used in the East Indies. Internally it is an irritant purgative, and externally it is used in the form of an ointment for psoriasis and eczema, also in suppositories for hemorrhoids and suspended in liquid petrolatum or glycerin, for gonorrhœa.

CIMICIFUGA. U. S. Black Cohosh. Black Snakeroot.

Cimicifuga. Rhizome. Br. Cimicifuga.

"The dried rhizome and roots of *Cimicifuga racemosa* (Linné), Nuttall (Fam. Ranunculaceæ)."
<U. S.

"The dried rhizome and roots of *Cimicifuga racemosa*, Ell." <Br.

Black cohosh, as this plant is familiarly known, is considerably used in medicine in rheumatism, dropsy, and in the treatment of St. Vitus dance; also as a tonic. The extract, fluid extract and tincture are official in the U. S. The powdered root is seldom given, fluid-preparations being preferred.

Average dose.—1 gm. (15 grains).

A liquid extract is official in the Br., dose 5 to 20 minims.

Macrotin or **Cimicifugin** is an impure resin obtained by precipitating a concentrated alcoholic extract by pouring it into water. This principle is considerably used by the Eclectics.

CINCHONA. Peruvian Bark.

A considerable number of varieties of cinchona bark are recognized in different pharmacopœias. The bark was first brought from Peru, hence its common name—Peruvian Bark, but it is now obtained, either native or cultivated from several South American states and tropical islands. The history and description of the species would fill a volume, therefore only the barks official in the U. S. and Br. will be considered here.

Cinchona. U. S. "The dried bark of *Cinchona Ledgeriana* Moens; *Cinchona Calisaya*, Wedell; *Cinchona officinalis*, Linné; and of hybrids of these with other species of cinchona (Fam. Rubiaceæ). It should yield not less than 5 percent. of total anhydrous cinchona alkaloids and at least 4 percent. of anhydrous ether-soluble alkaloids when assayed by the process given." <U. S.

The varieties above mentioned are mostly known in the market as calisaya or yellow cinchona bark, *Cinchona Flava*, chiefly used by the retail trade, but

manufacturers of quinine and other cinchona salts often employ other kinds.

Cinchona Rubra. Red Cinchona. U. S. **Cinchonæ Rubræ Cortex.** Red Cinchona Bark. Br. "The dried bark of *Cinchona succirubra*, Pavon (Fam. Rubiaceæ); or of its hybrids, yielding not less than 5 percent. of anhydrous cinchona alkaloids." <U. S. "The dried bark of the stem and branches of cultivated plants of *Cinchona succirubra*, Pavon." <Br.

This is known in the market as red cinchona bark, but the slab bark which is greatly inferior to the quill bark, may be supplied by dealers unless the "quill" bark is ordered.

Cinchona bark is extensively used in medicine either in the form of powder or some of its fluid preparations or extracts. It is also the source of quinine and its various salts and several cinchona alkaloids and their salts used in medicine, the more important of which are hereinafter described.

The dose of the powdered bark is from 10 to 60 grains, as a tonic or anti-periodic.

A fluid extract of Cinchona and a tincture and compound tincture are official in the U. S. P.

A liquid extract of cinchona is official in the Br., dose 5 to 15 minims.

Cinchona Alkaloids. A large number of Cinchona Alkaloids are known and used in medicine, but as the more important of them are official they will be noted under their proper headings in Part II.

CINNAMOMUM. Cinnamon.

Several varieties of cinnamon are used in medicine and are official in different pharmacopœias. The U. S. P. recognizes two varieties:

Cinnamomum Cassia. Cassia Cinnamon.—The bark of the shoots of one or more undetermined species of *Cinnamomum* grown in China, (Chinese Cinnamon). This was official in the U. S. P. 7th revision but was dismissed from the 8th.

In other pharmacopœias this is known as Cassia Bark, Cortex Cinnamomi; Cassia Ligneæ etc. Casse, Cannelle de Chine, Fr.; Cassienzimmt, Chinesischer Zimmt, G.; Cannella, It.; Canela, Mex., Sp.

Cinnamomum Saigonicum. U. S. Saigon Cinnamon. "The bark of an unidentified species of *Cinnamomum* (Fam. Lauraceæ)."

Cinnamomum Zeylanicum. U. S. "The inner bark of the shoots of *Cinnamomum zeylanicum*, Breyne (Fam. Lauraceæ)."

Cinnamomi Cortex. Br. Cinnamon Bark.—"The inner dried bark of shoots from the truncated stocks of *Cinnamomum Zeylanicum*, Breyne; obtained from cultivated trees. Imported from Ceylon, and distinguished in the market as Ceylon Cinnamon." <Br.

In other pharmacopœias this variety is known as Cortex Cinnamomi Zeylonica; Kaneel, Dutch; Cannelle de Ceylon, Fr.; Zeylon Zimmt, G.; Canella, It.; Canela, Sp.; Ceylonkanel, Nor.; Akta kanel, Swed.

The several varieties named are used in the U. S. and are designated in the U. S. P. Powdered cinnamon is used as an ingredient of aromatic powders, tinctures, and other liquid compounds, and the tincture and fluid extract are used as flavoring additions to various medicines. An oil is obtained from the bark by distillation, and the leaves also yield an oil by distillation which is sometimes used. Spirit of cinnamon is prepared from the oil and it is otherwise much used in pharmacy and medicine.

Cinnamon is a favorite aromatic, extensively used as a flavoring and employed as a grateful stimulant and carminative in medicine. The dose of the powder is from 10 to 20 grains, but it is usually given in some other form.

A fluid extract may be prepared with alcohol, and a tincture of cinnamon is official in the U. S. P.

Cinnamomi Fructus Immatura. Cassia Buds. The unripe fruits of the Chinese Cinnamon tree. The calyx surrounding the young germ is gathered before maturity and is known in the market as "cassia buds." They have the same properties as the bark but are more strongly aromatic.

Cinnaldehydum. Cinnamic Acid, $C_6H_5O_2$, which has lately come into prominence as a remedy for tubercular consumption, is obtained from the oil; also

from benzoin and other balsamic substances. It is now official in the U. S. P. and will be farther noted in Part II.

CIVETTA. Civet. Zivetha.

This is an unctous secretion obtained from the Civet cat. Used chiefly in perfumery. It has a peculiar musky odor and is employed to give permanence to perfumes.

COCA. U. S. COCÆ FOLIA. Br. Coca Leaves.

"The dried leaves of *Erythroxylon Coca*, Lamark (Fam. *Erythroxylaceæ*), known commercially as Huanico Coca, or of *E. Truxillense Coca*, known commercially as Truxillo Coca; yielding, when assayed by the U. S. process given, not less than 5 percent. of the ether-soluble alkaloids of Coca." <U. S.

"The dried leaves of *Erythroxylon Coca*, Lam., and its varieties." <Br.

Several varieties of coca leaves are found on the market, and considerable difference exists among authorities as to which is most valuable in medicine. The leaves are obtained from Bolivia and Peru where the plants are cultivated for the market, and as the Huanico leaves from Bolivia yield a larger percentage of cocaine than the Truxillo variety from Peru, they are usually preferred for manufacturing purposes.

The leaves are considerably used in making medicinal preparations of which a fluid extract is official in the U. S., and several proprietary Elixirs and Wines are unofficial; also in the production of the alkaloid cocaine and its salts.

Coca is a nerve stimulant and possesses properties similar to tea and coffee. It is used in South America to sustain the nervous strength during excessive labor or journeys. In these countries the leaf is chewed like tobacco.

A liquid extract is official in the Br., dose $\frac{1}{2}$ to 1 fl.drachm.

Cocaine is the principal alkaloid of the leaves and is considered in Part II. **Ecgonine**, $C_8H_{15}NO_3$, is derived from it; also **hygrine**, a volatile liquid alkaloid, and **cocatannic acid**; but they are little used in medicine.

Other cocaine salts and combinations are described in Part II.

COCCULUS INDICUS. Fish-berries.

The fruit of *Anamirta Cocculus*, (Fam. *Menispermaceæ*). Native of the East Indies. A poisonous drug, seldom used internally but employed externally to kill parasites. A decoction of the berries is applied to kill lice, gnats, ringworm of the scalp or face and other forms of parasitic eczema. When employed internally it is best given in the form of fluid extract, 1 to 3 minims.

COCCUS. U. S., Br. Cochineal.

"The dried female insect, *Pseudococcus cacti* (Linné), Burmeister." <U. S.

"The dried fecundated female insect, *Coccus cacti*, Linn., reared on *Nopalea Coccinellifera* and other species of *Nopalea*." <Br.

Cochineal is obtained chiefly from Mexico and Central America where they are found on different kinds of cactus, and gathered by the natives.

This was formerly given as an anodyne but is now little employed as a medicine, but is used as a red coloring for medicinal and other preparations and as a dye for coloring.

Carmine. This is a red coloring matter obtained from cochineal, and prepared by precipitating a decoction of cochineal with chloride of tin solution. The best quality of carmine is known as No. 40. Carmine is used in many toilet preparations, either in powder or solution, and its solution is used for coloring some medicinal preparations, elixirs, syrups etc. It is readily dissolved in alkaline solutions, but is precipitated by acids.

Carminic Acid, $C_{17}H_{15}O_{10}$. This is another coloring matter of a purple-red color obtained by treating cochineal first with ether, then with boiling alcohol, and allowing the alcoholic tincture to evaporate spontaneously, when the carminic acid is precipitated.

COCHLEARIA. Scurvy-grass.

The entire plant, *Cochlearia officinalis*, grown in northern and central Europe. It is similar in its medicinal properties and action to horseradish grown in the United States, and official under the title *Armoraciac Radix* in the Br. P.

The plant, when fresh has a pungent, unpleasant odor and a warm, acrid, bitter taste. It is a stimulant to the digestive organs, diuretic and antiscorbutic. It is employed for scurvy, chronic rheumatism, scrofula and paralysis, and in Europe is an ingredient in several antiscorbutic compounds.

A fluid extract is prepared; dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

A syrup and tincture are also prepared.

COLCHICUM. U. S., Br.

Both the root (corm) and the seed of colchicum are official in the U. S. and Br. pharmacopœias.

Colchici Cormus. U. S.—Colchicum Corm.

Colchici Cormus. Br.—Colchicum Corm.

"The fresh corm of *Colchicum autumnale*, Linné (Fam. Liliacæ); yielding, when assayed by the process given, not less than 0.55 percent. of colchicine." <U. S.

"The fresh corm of *Colchicum autumnale*, Linn., collected in early summer; and the same stripped of its coats, sliced transversely, and dried at a temperature not exceeding 150°F. (66.5°C.)." <Br.

Colchici Semen. U. S.—Colchicum Seed.

Colchici Semina. Br.—Colchicum Seeds.

"The seed of *Colchicum autumnale*, Linné (Fam. Liliacæ), yielding, when assayed by the process given, not less than 0.55 percent. of colchicine." <U. S.

"The dried ripe seeds of *Colchicum autumnale*, Linn." <Br.

This plant is a native of Europe and northern Africa and the root and seeds are imported to this country. Fluid extracts, tinctures and wines of the root and seed are official and are considerably used as remedies for rheumatism and rheumatic gout. It has the property of separating uric acid from the blood and diminishes the formation of urates in the system. The dose of the dried bulb or seed is from 3 to 8 grains every 4 hours, but the fluid preparations are generally given.

Colchicina, Colchicine. $C_{22}H_{25}NO_6$.—This alkaloid is the active principle of colchicum and is obtained from the corm, seeds or flowers of the plant in the same manner as is directed for Aconitine. It is, however, very expensive, manufacturers quoting it at \$14.00 per ounce. The dose of the amorphous alkaloid is $\frac{1}{328}$ to $\frac{1}{60}$ grain.

COLLINSONIA. Stone Root.

The root of *Collinsonia canadensis* (Fam. Labiatae).

This root grows in the United States in woods and fields from Canada to Carolina. It is an herb with heavy knotty roots, and has a warm pungent taste due to a volatile oil which it contains. It is tonic, astringent and alterative, being a reputed remedy for gravel. It is also useful as a remedy for rheumatism, dyspepsia, asthma etc.

A fluid extract is prepared; dose 0.15 to 1 Cc. (2 to 15 minims).

Collinsonin. A concentrate prepared by precipitating a strongly alcoholic, concentrated extract of *Collinsonia* in water, and drying the precipitate. Dose 1 to 5 grains.

COLOCYNTHIS. U. S. Colocynth.

"The peeled dried fruit of *Citrullus Colocynthis*, Schrader (Fam. Cucurbitaceæ), deprived of its rind." <U. S.

"The dried pulp of the fruit of *Citrullus Colocynthis*, Schrad., freed from seeds." <Br.

The fruit of the "Bitter Cucumber" is obtained from a trailing vine somewhat resembling the watermelon, and is the size of a small orange. It contains a white spongy mass enclosing numerous seeds. The dried pulp or

inside spongy mass, freed from the seeds, is employed in medicine. This is imported from Turkey and various parts of Asia and Africa, and is known in commerce as "Colocynth Apple."

Average dose.—0.065 gm.=65 milligrammes (1 grain).

It is prepared in various forms as extracts, fluid extract etc., and is an ingredient in a number of well known medicinal compounds. Owing to its cathartic action its extract is an ingredient of cathartic pills, powders etc., and it is for the same reason considerably used in liquid laxatives and cathartics.

A fluid extract is prepared with diluted alcohol, dose 0.25 to 0.5 Cc. (4 to 8 minims).

Colocynthin. This is the bitter principle of the pulp, and is obtained by boiling the pulp in water, evaporating the decoction to an extract, extracting the principle by macerating the extract with alcohol, filtering, evaporating the filtrate, macerating the residue with a little cold water which dissolves out the potassium acetate with which the bitter principle is associated without dissolving the colocynthin, pouring off the aqueous solution, then drying and reducing it to a powder. The dose of colocynthin is 1 grain.

CONDURANGO. Condurango Bark.

The dried bark of *Gonolobus Condurango*, Triana (Fam. Asclepiadaceæ).

This plant is a climbing vine found in Ecuador and other Columbian states, where it grows to the height of 20 to 30 feet, attaching itself to trees. The bark is obtained by beating the stem with a mallet, and drying the peeled-off bark in the sun. It was formerly recommended as a remedy for cancer, and is, undoubtedly, a good alterative and blood-cleanser. The bark has but little odor but has a mild bitter acrid taste.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

CONIUM. U. S., Br.

Both the leaves and fruit of conium are official in the Br. P., but only the fruit is recognized by the U. S. P.

Conii Folia. Br.—Hemlock leaves.

"The fresh leaves and young branches of *Conium maculatum*, Linn., collected when the fruit begins to form." <Br.

Conium. U. S. Hemlock.

"The full-grown, but unripe fruit of *Conium maculatum*, Linné (Fam. Umbelliferæ), carefully dried and preserved and yielding, when assayed by the process given, not less than 0.5 percent. of coniine. After being kept more than two years conium is unfit for use." <U. S.

"The full-grown, dried, unripe fruit of *Conium maculatum*, Linn." <Br.

Conium is an herbaceous plant, native of Europe, but now abundant in the U. S. It is found usually along the road-sides or in waste fields, slashings or thin woods, and is familiarly known as Poison Hemlock.

The fresh leaves are used in making extract and ointment and the seeds are used for making extract, fluid extract and tincture. The preparations of conium are used chiefly as antispasmodic internally, and externally in the form of plaster, ointment, oil and liniment as anodyne.

A fluid extract is official. Average dose 0.2 Cc. (3 minims).

Coniina. Coniine. $C_8H_{17}N$.—The valuable medicinal principle of conium is a volatile liquid alkaloid called Conine or Coniine. It is obtained by exhausting conium with boiling water in the water-bath percolator, and distilling the percolate until about one-third passes over. This portion contains the volatile alkaloid, which is separated from its solution by first filtering through animal charcoal to remove all traces of oil or resin, then shaking the filtrate with ether, pouring off the ethereal solution which contains the alkaloid, and allowing the ether to evaporate spontaneously; the liquid remaining after the evaporation of the ether is Coniine. It contains no oxygen, is soluble in water, alcohol or ether, and has a peculiar odor resembling the urine of mice. The dose is from $\frac{1}{10}$ to $\frac{1}{2}$ grain.

Cicuta Virosa. Europe. Water Hemlock. This plant, which is also called *Cicuta Maculata* (U. S.), is allied to *Conium* and was formerly employed in medicine. Its properties are similar but more poisonous and it should not be used.

CONVALLARIA. U. S. Lily of the Valley.

"The dried rhizome and roots of *Convallaria majalis*, Linné (Fam. Liliaceæ)." <U. S.

This plant which is cultivated in flower-beds and gardens was a native of Europe, but has been domesticated in the U. S.

Average dose.—0.500 gm.=500 milligrammes (7½ grains).

A fluid extract is prepared from it which is used in the treatment of epilepsy and dropsy, and has also been employed with success in valvular heart trouble.

Dose ⅓ to 1 Cc. (5 to 15 minims).

Convallarin. This is a principle obtained in the usual manner from the root, and used as a purgative and diuretic in doses of 3 to 4 grains. **Convallamarin**, another principle, produces vomiting even in small doses and seems to be the principle that acts upon the heart. It should be cautiously given in doses of not more than ½ grain.

COPAIBA. U. S., Br. Copaiba.

Syn.—**Copaiva.** (Br.). **Balsam Copavia.**

"An oleo-resin derived from one or more South American species of *Copaiba* (Fam. Leguminosæ)." <U. S.

"The oleo-resin obtained from the trunk of *Copaifera*, Lamsd., Desf.; and other species of *Copaifera*, Linn." <Br.

This is an oleo-resin obtained from the trunk of various species of *Copaifera*, found in Brazil, Venezuela, New Granada and other parts of Central and South America.

The method of collecting this oleo-resin is usually to cut cavities in the trunks of the trees near the base, allowing the oleo-resin to drain into them. Two varieties of *Copaiba* are found in the market. The *Para*, which is thin and contains a larger portion of oil, and the *Angostura*, which is thicker and contains more resin. The specific gravity of *Copaiba* runs from 0.956 for the lighter variety to 0.995 for the heavier, at 25°C. (77°F.). It is insoluble in water but may be made into an emulsion, in which form it is usually administered, by the aid of acacia, or other emulsifying agents.

It is a favorite remedy for gonorrhœa and catarrhal conditions of the bladder; and urinary passages.

Average dose.—1 gm. (15 grains).

COPTIS. Gold Thread.

The entire plant, *Coptis trifolia*, native of North America and Europe, (Fam. Ranunculaceæ).

The plant has a fine filiform creeping rhizome of a bright golden color and is used by mastication or in the form of infusion for sore mouth or canker. It is a pure bitter and contains berberine as its active medicinal property. It is chiefly used in domestic medicine. It might be quite generally used for the same purposes as Golden Seal.

A fluid extract is prepared, dose 2 to 4 Cc. (½ to 1 fl.drachm).

Coptis Anemonæfolia. Oh-Ren. The root of a plant native of Japan, (Fam. Ranunculaceæ). A bitter tonic similar to the above. Highly recommended for inflammation of the eye.

Coptis Teeta. Mishmi Teeta. The root of a plant found in India, China and Khorasan, (Fam. Ranunculaceæ). The rhizome is of a golden-yellow color. It is a pure bitter tonic used in debility, dyspepsia and convalescence.

Dose of powdered root 10 to 15 grains.

CORIANDRUM. U. S. Coriander.

Coriandri Fructus. Br. Coriander Fruit.

"The dried ripe fruit of *Coriandrum Sativum*, Linné (Fam. Umbelliferæ)." <U. S.

"The dried ripe fruit of *Coriandrum Sativum*, Linn." <Br.

Coriander seed, as it is known in the market, is imported from Europe. It is considerably used in compound species as an aromatic and is a favorite flavoring for many medicinal preparations.

A fluid extract is prepared from the fruit with alcohol, dose 1 to 2 Cc. (15 to 30 minims). Chiefly used for flavoring.

A volatile oil is distilled from it which contains all its aromatic properties. This is considerably used as a flavoring in elixirs, its chief constituent is **coriandrol**, $C_{10}H_{16}O$, which is an oxygenated terpene, and is isomeric with borneol obtained from camphor.

CORNU CERVI. Deer's Horn. Hart's Horn.

This was at one time considerably used in pharmacy and is still official in several European countries. A jelly is prepared from it which makes a very nutritious food. From it an impure solution of ammonium carbonate or "spirit of hartshorn" was first obtained by destructive distillation. It is used for the same purposes as calcium carbonate.

Rasped or shaved deer's horn may be had of jobbers in drugs.

Cornu Cervi Præparatum. This is properly a gelatin or glue made by macerating 100 parts of rasped horn with 100 parts of hydrochloric acid and water sufficient to cover it, and after some time pouring off the liquor and washing the residue with water until no acid reaction remains, then drying in warm air.

Cornu Cervi Ustum. This is prepared by burning deer's horns until all gelatinous matter has been volatilized, and reducing the calcined residue to a powder. It is practically the same as calcium phosphate.

Cornu Cervi Artificale. Artificial deer's horn may be prepared by melting one part of gum ammoniac with 2 parts of gutta percha together by water-bath, and working them together until they are thoroughly incorporated. This may be used in place of deer's horn for making handles and articles such as are usually made from it.

CORNUS. Cortex Cornus. Dogwood Bark.

Several species of *Cornus* are used in medicine. These shrubs, or small trees, are native of the northern U. S. and Canada, and have general astringent and tonic properties, being used chiefly in domestic medicine for intermittent fevers and malaria.

Cornus Florida is the regular dogwood, the bark of the root being generally used.

Cornus Circinata is the Green Ozier, the bark of the stem and twigs being generally employed.

Cornus Sericea is the swamp dogwood growing in marshes and moist woods. The medicinal action and properties of all these species are similar.

Fluid extracts of each are prepared, dose 1 to 4 Cc. ($\frac{1}{4}$ to 1 fl.drachm).

Cornin. The bitter principle of dogwood. It occurs in white silken needles, soluble in alcohol and water; the dose 2 to 5 grains.

CORTICES — BARKS.

The following are the names for bark in the principal pharmacopœias:

Bast, Dutch; Écorce, Fr.; Rinde, Gr.; Corteccia, It.; Corteza, Mex., Sp.; Bark, Nor., Swed.

In the U. S. P. the Latin title does not indicate that the substance is a bark, as "Cinnamomum," in the Br. P. the title is "Cinnamomi Cortex," in most European authorities the Latin title is employed, as "Cortex Cinnamomi;" but in the Fr., Sp., Mex., and Italian, the common title is used either with the word signifying bark preceding or following the name of the bark, as "Écorce de Cannelle," Fr., or simply the common name of the drug without the word signifying bark in connection with it, as "Canela," Mex., Sp.; "Cannella," It.

In this work the barks official in the United States and Great Britain are described in the text and arranged alphabetically under the title of the plant from which it is obtained. Most of the barks official in these authorities have also the foreign official names given; and as there are but few barks official in

other countries that are not somewhere noted in this work, they will not be classified under this heading.

CORYDALIS. Turkey Corn.

The dried tubers of *Dicentra Canadensis*, DC., (Fam. Fumariaceæ); also called *Corydalis Formosa*, Turkey Pea, Squirrel Corn.

It is found abundantly in open woods throughout the middle and western U. S., and is highly esteemed by Eclectic practitioners. The little tubers are round or roundish, and have a persistent bitter taste. The medicinal properties are tonic, diuretic and alterative, being particularly indicated in scrofula, syphilis and cutaneous eruptions. The powdered tubers are quite generally prescribed and have action similar to Golden Seal.

A fluid extract is prepared, dose 1 to 2 Cc. (15 to 30 minims). A compound syrup and tincture are also used.

Corydalin. This is a concentrate made after the method of Eclectic concentrates, dose $\frac{1}{2}$ to 1 grain.

Corydaline. An alkaloid obtained from *Corydalis*, crystals readily soluble in ether and alcohol. Several other principles are obtained but are little used.

COTO. Cortex Coto. Coto Bark.

A dried bark of an unidentified large tree of Bolivia, having aromatic, stimulant and astringent properties. A bark similar to this known as paracoto bark is more commonly found in the market. These barks are employed in catarrhal, tubercular and typhoid diarrhoeas.

A fluid extract is prepared, dose $\frac{1}{3}$ to 1 Cc. (5 to 15 drops).

Cotoin. A principle extracted from Coto bark, dose $\frac{1}{4}$ to 3 grains.

Paracotoin. A principle extracted from paracota bark, dose $\frac{1}{4}$ to 3 grains.

CROCUS. Br. Saffron.

"The stigmas of *Crocus sativus*, Linné (Nat. ord. Iridaceæ)." <U. S. 7th revision.

"The dried stigmas and tops of the styles of *Crocus sativus*, Linn." <Br.

The true saffron is imported from France, Spain, Greece, Asia Minor and Mediterranean ports, but a little of very good quality has been produced in this country and it is probable that the time is not far distant when the American supply will equal the domestic demand.

The true saffron should not be mistaken for the Safflower or American Saffron, *Carthamus tinctorius*, which is commonly sold as saffron in this country and which has no particular medicinal value.

Several principles have been obtained from saffron but they have not come into any general use and are not sufficiently recognized to establish their character.

Saffron is employed in medicine chiefly as an addition to species and as a mild carminative. The drug is chiefly used for making an infusion to impart color and flavor to various preparations.

A tincture of saffron (1:10) is prepared with diluted alcohol, dose 4 to 8 Cc. (1 to 2 fl.drachms). Used chiefly for coloring other medicines.

CUBEBA. U. S. Cubeb.

Cubebæ Fructus. Br. Cubebs.

"The dried unripe fruit, but fully grown, of *Piper Cubeba*, Linné filius (Fam. Piperaceæ)." <U. S.

"The dried full-grown unripe berries of *Piper Cubeba*, Linn. fil." <Br.

This spicy pepper is obtained from Java, Penang and some other parts of the East Indies. It is considerably employed in medicine as a stimulant to the mucous membrane and is used in powder, in solid and fluid extract, in oleo-resin and tincture. The powder is also an important ingredient of catarrhal cigarettes and of lozenges for catarrhal and bronchial troubles. An oil is also distilled from the berries, which is used internally for the same purposes as cubeb, and is a valuable ingredient of gonorrhœa pastes and mixtures.

Average dose.—1 gm. (15 grains).

A fluid extract is official in the U. S. P. Average dose 1 Cc. (15 minims).

Cubebin, $C_{10}H_{10}O_3$, is a principle obtained from cubebs: cubebic acid, $C_{13}H_{14}O_7$, is also found, and a species of camphor known as cubeb camphor, $C_{15}H_{26}O_7$, separates from the oil when chilled.

Cubebic Acid. $C_{13}H_{14}O_7$.—This acid which is obtained from cubeb is a white wax-like substance, turning brown on exposure to the air. It is supposed to be the active principle of cubeb. The dose is from 5 to 15 grains.

CUMINUM. Fructus Cumini. Cumin Seed.

The dried fruit (seed) of *Cuminum Cyminum*, Linné (Fam. Umbelliferae).

This plant is native of Egypt and Africa, but cultivated in other warm countries. Its virtues reside in essential oils and principles obtained by distillation from the seeds. Their medicinal action is stimulating and carminative. The oil has a peculiar, rather disagreeable aromatic odor. The seeds are frequently used as an addition to species and medicinal compounds, having a flavor between caraway and anise.

Dose of powdered seeds, 2 to 8 gm. ($\frac{1}{2}$ to 2 drachms).

CURARE. Ourari. Woorara.

South American Indian Arrow Poison.

This is official in the Fr., Ger. S. and Sp. pharmacopœias.

As found in this country it is a blackish, brittle extract or resinoid contained in earthenware jars, into which it must have been introduced while a warm liquid. It is a powerful poison of rather uncertain composition, producing paralysis, and stopping the action of the heart. The dose by hypodermic injection is stated to be from $\frac{1}{30}$ to $\frac{1}{12}$ grain.

Curarine. This has been isolated as a crystallizable alkaloid, but its chemical formula has not yet been definitely ascertained. It is soluble in water and forms soluble salts with acids.

Curarine Hydrochloride. This may be prepared by dissolving curarine in a small quantity of hydrochloric acid, concentrating and crystallizing. The dose by hypodermic injection is $\frac{1}{300}$ to $\frac{1}{250}$ grain.

The acetate, nitrate and sulphate of curarine may be made in the same manner.

Curare and its salts have been recommended for violent convulsive diseases, as tetanus, hydrophobia etc., and are now being used for epilepsy, chorea etc.

CURCUMA. Rhizoma Curcumæ. Turmeric.

The dried rhizome of *Curcuma longa*.

This was formerly official in the U. S. and is now included in several European pharmacopœias. It is used as a condiment and as a yellow coloring in many pickle and mixed spice compounds, also in coloring some medicinal preparations; and especially in making turmeric test paper which turns brown with alkalis and is restored to its yellow color by most acids. Tincture of Turmeric for making test paper will be noticed among the tinctures.

CUSPARIÆ CORTEX. Br. Cusparia Bark. Angustura Bark.

"The dried bark of *Cusparia febrifuga*, DC." <Br.

This was formerly official in the U. S. P., but was omitted from the 1880 revision.

This South American bark is a pure aromatic bitter, and is extensively used in making bitters and cordials for stimulating the appetite. It is also supposed to possess valuable tonic properties and to act on the kidneys. It is known, however, chiefly for its use in "Angustura Bitters," which are favorite bar bitters. A fluid extract is prepared from the bark and it is used as an ingredient in several medicinal compounds.

Angosturine, $C_{10}H_{10}NO_4$, is an alkaloid obtained from the bark in the usual manner and sometimes used in medicine.

Cusparin is a neutral principle or resin precipitated from a concentrated alcoholic extract. Galipine, galipidine, cusparine and cusparidine are also alkaloids obtained from the bark but they are not used in medicine.

CUSSO. U. S., Br. Kousoo. (Brayera).

"The dried panicles of the pistillate flower of *Hagenia Abyssinica*, (Bruce), Gmelin (Fam. Rosaceæ)." <U. S.

"The dried panicles of pistillate flowers of *Brayera anthelmintica*, (Knuth)." <Br.

These flowers are imported from Abyssinia and are found in the market in compressed clusters with a portion of the flower-stalk attached.

The drug is used chiefly as a tænicide. It contains a bitter acrid resin which is supposed to be its active principle and is named **Kosin**. This may be isolated by macerating cusso repeatedly with alcohol to which calcium hydroxide has been added; the residue is boiled in water and the liquids are mixed and distilled and the residue treated with acetic acid which precipitates kosin; this is then dried and powdered.

Cusso is generally given in an infusion—the drug altogether for tape-worm. An adult dose is half an ounce of the powdered flowers mixed with half a pint of water and taken when cool. If the bowels do not operate within a few hours a dose of castor oil should be given. Of the principle kosin, 40 grains in 4 doses may be given for the same purpose.

Koussein. An amorphous principle, marketed under this title, is similar to Kosin, and is supposed to represent the active medicinal value of the drug. The dose is the same as kosin, 40 grains divided into 4 doses given $\frac{1}{2}$ hour apart.

CYDONIUM. Semen Cydoniæ. Quince Seed.

The seed from the core of the common quince, *Cydonia vulgaris*.

This is official in most of the European countries. It is chiefly useful for making a mucilage, which in medicine is valuable to allay irritation, or as a vehicle for other medicines, and in toilet preparations is employed for various purposes. It is a demulcent, and yields its properties to boiling water, with which a mucilage may be readily prepared.

CYNOGLOSSUM. Hound's Tongue.

The leaves and root of *Cynoglossum officinalis*, Linné (Fam. Boraginaceæ).

This plant is a biennial found in Europe and the U. S. Its name is derived from the shape of its leaves which are hairy, elliptic and petiolate. It is official in several countries of Europe. Its medicinal action is anodyne, astringent and demulcent, used in catarrh, coughs and diarrhoea. The fresh plant is applied, bruised, to ulcers, goitre and indolent sores.

A fluid extract is prepared, dose 4 to 8 Cc. (1 to 2 fl.drachms).

CYPRIPEDIUM. U. S. Ladies' Slipper.

"The dried rhizome and roots of *Cypripedium hirsutum*, Miller; or of *Cypripedium parviflorum*, Salisburg (Fam. Orchidaceæ)." <U. S.

This plant is a native of the U. S., growing in damp soil in the scattered woods; usually along the margins of streams. The beautiful flower, which resembles a slipper, justifies its common name, "Ladies' Slipper," or moccasin plant.

It is employed in medicine as a nervine and nerve tonic, and is considerably used by Eclectics in the treatment of epilepsy, hysteria and general nervous irritability. Its uses are generally similar to English valerian, but it has more tonic effect. A fluid extract is official in the U. S. P., and a principle, **cypripedin**, is obtained by precipitating an alcoholic extract with water. An oleo-resin may also be prepared in the same manner as other oleo-resins, which probably more truly represents the virtues of the drug than any other preparation.

Average dose of the powdered root is 1 gm. (15 grains), 3 or 4 times a day; and of the oleo-resin $\frac{1}{2}$ to 3 grains.

A fluid extract is prepared with diluted alcohol, average dose 1 Cc. (15 minims). Official in U. S. P.

DAMIANA.

The leaves and tops of *Ternera aphrodisiaca*, (Fam. *Terneraeae*).

This is a small mint-like plant, native of Mexico and California. It yields a volatile oil and has an aromatic odor and a warm, bitter camphoraceous taste. Its properties are tonic, laxative and aphrodisiac. It is employed chiefly as a sexual stimulant.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

This drug is supposed to be an ingredient in several proprietary compounds known as "Damiana Bitters," "Damiana Wafers," "Mormon Elders Tonic" etc.

DELPHINUM. Larkspur.

The seed of *Delphinium Consolida*, (Fam. *Ranunculaceae*).

It is found throughout Europe, China and the U. S., and is chiefly cultivated for its handsome flowers. Its medicinal action is diuretic, emmenagogue and vermifuge, but is most generally used for killing lice and other vermin which infect the human family. For this purpose a decoction is prepared.

A fluid extract representing its medicinal properties is also made, the dose being from 2 to 4 drops.

Delphinine. This is an alkaloid prepared from Larkspur and representing its medicinal properties. The dose is from $\frac{1}{4}$ to $\frac{1}{2}$ grain.

DICTAMUS. White Fraxinella.

The bark of the root (Fam. *Rutaceae*). Native of Europe. Chiefly cultivated. It is antispasmodic, antiperiodic and emmenagogue. Useful for epilepsy, hysteria etc.

A fluid extract is prepared, dose 1 to 2 Cc. (15 to 30 minims).

DIGITALIS. U. S. Digitalis. Fox Glove.**Digitalis Folia. Br. Digitalis Leaves.**

"The dried leaves of *Digitalis purpurea*, Linné (Fam. *Scrofulariaceae*), collected from plants of the second year's growth." <U. S.

"The dried leaves of *Digitalis purpurea*, Linn, collected from plants commencing to flower." <Br.

Digitalis is a native of central Europe, but is now quite generally cultivated in this country as a garden ornament and also for medicinal use. Most of the leaves used for medicine, however, are imported from Germany. The chief value of *digitalis* in medicine is as a heart tonic, particularly in valvular troubles. The drug has a cumulative action which must be guarded against. The dose of the powdered leaves is from $\frac{1}{2}$ to 2 grains, but the extract, fluid extract, or tincture which are official, are generally administered.

Average dose.—0.065 gm.=65 milligrammes (1 grain).

Digitalin. The active principle of *digitalis* is obtained by precipitating an extract. Several substances bearing that name and differing somewhat in characteristics and properties are found in the market. They all, however, seem to possess the medicinal virtues of *digitalis* in concentrated form, and to be divisible into several other principles of like effect but of different name. The dose should not exceed $\frac{1}{60}$ of a grain and should not be frequently repeated.

Digitalein. A glucoside obtained from the leaves. It is a pale yellow amorphous powder readily soluble in water and alcohol. It is said to combine the properties of digitalin and digitoxin.

Digitoxin. One of the constituents of digitalin. It is the most poisonous of the glucosides which make up digitalin. Its properties are similar to *digitalis*. The dose is $\frac{1}{200}$ to $\frac{1}{100}$ grain twice a day.

Other Digitalis Preparations.

Digitin. Digitalin Crystals. Digitonin. This is a crystalline produce separated from German digitalin, of which it is a constituent. It acts as a cardiac

depressant when administered hypodermically.

Digitalin verum. Kiliani. This is supposed to be the true digitalin separated from associated principles which are present in the product usually called German or French digitalin. It is insoluble in water and is very expensive, being quoted \$7.25 per gram.

Digalen. Liquor Digitoxini Solubilis. This is a sterilized solution containing 1 part of soluble digitoxin (Cloetta) in 1000 parts of glycerin and 1600 parts of distilled water. It is recommended to sustain heart action, dose 1 to 2 Cc. (15 to 30 minims).

Digipuratum. A purified extract of digitalis claimed to contain 0.4 percent. of digitoxin and 4 percent. of digitalin in the form of tannate. Its uses and action are the same as digitalis, but because of its purification it is claimed to be much more effective. It is put up in $1\frac{1}{2}$ grain tablets.

Digistrophan. This name is applied to tablets claimed to represent the active principles of digitalis and strophanthus. The substance is prepared by evaporating their mixed fluidextracts to dryness, in vacuo, and by the addition of milk sugar, making into tablets which represent $1\frac{1}{2}$ grains digitalis and $\frac{3}{4}$ grain strophanthus, combined with sodium acetate and caffeine. They are recommended as diuretic and heart tonic.

Digitol. H. K. Mulford Co. of Philadelphia put out a preparation by this name, claimed to be a fat-free tincture of digitalis, of the same strength as the official tincture, viz., 10 percent.

Digitalone. This is a non-alcoholic liquid claiming to represent 10 percent. digitalis, with about 0.6 percent. of chloretone as a preservative. It is intended for subcutaneous injection and for internal use. Dose 5 to 30 minims. P. D. & Co., Detroit, Mich.

Digitalysatum. This is claimed to be a preparation of fresh digitalis leaves standardized to represent a gram of the fresh, or 0.2 gram of the dried leaves in a gram of the preparation. The dose is 5 to 15 minims, limited to 75 minims daily.

DIOSCOREA. Wild Yam.

The rhizome of *Dioscorea villosa*, (Fam. Dioscoreaceæ).

This plant, which is also called colic root, is a perennial creeper found throughout the central and southern U. S. It is esteemed by the negroes as a cure for rheumatism.

It has properties similar to the Saponaceous plants and is expectorant, diaphoretic and anti-spasmodic, being a favorite remedy for bilious colic.

A fluid extract is prepared, dose 1 to 4 Cc. ($\frac{1}{4}$ to 1 fl.drachm).

Dioscorein. The active principle of this plant, dose 1 to 4 grains.

DIOSPYROS. Persimmon.

The unripe fruit of *Diospyros Virginiana* (Fam. Ebenacæ).

This is commonly known as the Persimmon tree, native of the southern states. The unripe fruit contains a viscid juice of astringent taste, the bark is also astringent and bitter.

A fluid extract is prepared from the bark which is useful in chronic diarrhoea, leucorrhœa and uterine hemorrhages, also locally, diluted, as a gargle for sore throat, and as an astringent wash for ulcers. Dose of the fluid extract, 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

Diospyros Kaki. Japanese Persimmon. This is a native of Japan and East Indies. The bark of the root is tonic, with peculiar action on the mucous membrane. Useful in dysentery, catarrh of the stomach, bowels and bladder.

A fluid extract is prepared, dose 1 to 4 Cc. (15 to 60 minims).

DIRCA. Leatherwood. Moosewood.

"The bark of *Dirca palustris*, (Thymelacæ).

This plant is a shrub growing in moist woods throughout the U. S. The bark is very strong and tough and is used for tying up bundles. In medicine it is a sialogogue and acts upon the glandular system. It is also an irritant to

the skin when applied and its properties generally are like mesereum, which is its foreign relative.

A fluid extract is prepared with a strongly alcoholic menstruum, dose 10 to 15 minims.

DITTANY.

The herb *Culina Mariana*. Native of New England. Used chiefly as a domestic remedy for colds and influenza, and as emmenagogue, preferably in the form of a hot infusion.

This plant yields a volatile oil by distillation similar to anise.

DRACONTIUM. Skunk-cabbage.

The rhizome and roots of *Dracontium foetidum*, (Fam. Araceæ).

This plant grows in swamps and moist grounds throughout the U. S. and Canada. It is a very rank plant, having the peculiar odor from which it derives its common name. Its properties are antispasmodic, narcotic and stimulant, and it is used for coughs, catarrh, chronic rheumatism and St. Vitus dance with excellent results.

A fluid extract is prepared, preferably from the green plant. The dose is from 2 to 4 gm. ($\frac{1}{2}$ to 1 fl.drachm).

DROSERA. Sundew.

A small plant having fleshy, radical leaves and covered upon the upper surface with numerous whitish or reddish-colored bristles. It is found in moist rich ground in all countries. The plant is without odor, but the leaves have an acid, acrid, bitterish taste. It acts as an antispasmodic and is used in bronchial coughs and asthma.

A fluid extract should be made from the green plant, dose 5 to 30 minims.

DUBOISIA.

The leaves of an Australian plant, *Duboisia myoporoides*, (Fam. Solanaceæ).

This has similar properties as other solanaceous plants, belladonna, hyoscyamus etc., and is specially recommended for the treatment of ophthalmic goitre and Basedow's disease.

A fluid extract is prepared, dose $\frac{1}{3}$ to $\frac{2}{3}$ Cc. (5 to 10 minims).

Duboisine. An alkaloid obtained from *Duboisia*, identical with hyoscyamine and daturine; dose $\frac{1}{100}$ to $\frac{1}{50}$ grain.

Duboisine Sulphate. Prepared by dissolving the alkaloid with a little diluted sulphuric acid and crystallizing. The dose is the same as of the alkaloid. It is employed as a mydriatic preferable to atropine.

DULCAMARA. Bittersweet.

"The young branches of *Solanum Dulcamara*, Linné (Fam. Solanaceæ)." <U. S., 7th revision.

This plant is a climbing shrub growing to the height of 6 or 9 feet. The dried twigs which are used in medicine have a thin bark externally pale-greenish and internally green. The odor is slight and the taste bitter, afterwards sweetish, from which characteristic the plant derives its name, "Bittersweet." It is diuretic, diaphoretic and alterative, with mildly narcotic action. It is given for rheumatism and chronic catarrh but more especially for its action upon the skin in scaly eczema, pityriasis, psoriasis etc.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm); and an ointment by steeping the twigs in hot lard for some time.

ECHINACEA ANGUSTIFOLIA. Cone-Flower.

The root of a slender plant found in the western U. S. (Fam. Compositæ). This is highly recommended as an alterative in syphilis and old chronic ulcers, fever-sores etc., both for internal and external use. It has also been used as a remedy for snake bites and hydrophobia. Another species, *Echinacea purpurea*, commonly known as Black Sampson, is used for the same purpose.

A fluid extract is prepared. Dose 15 to 30 minims.

Echafolta. This is a brand name given to an Eclectic preparation of this drug for internal use. It is similar to a fluid extract.

Echidine. A mixture of the active principles of echinacea and thuja combined with iodine is put out under this name. It is used both internally and externally. Dose 2 to 5 minims.

Ecthol. A liquid antiseptic intended for internal use and composed of the active principles of echinacea and thuja in solution.

ELASTICA. U. S. Rubber.

Caoutchouc. Br. India-Rubber.

This appears under the above different headings in the U. S. and Br.

"The prepared milk-juice of several species of *Hevea*, Aublet (Fam. Euphorbiaceæ); known in commerce as Para Rubber." <U. S.

"The prepared milk-juice of *Hevea braziliensis*, Muell., Arg., and probably other species known in commerce as pure Para rubber." <Br.

This is the concrete juice of several species of *Hevea* found in tropical countries, either in native forests or cultivated. The trees are "tapped" and the fresh milky juice that exudes gathered and spread over mounds of unbaked clay and exposed to the heat or torches, by which treatment the smoky color of most varieties is acquired. When the mass is nearly dried another layer of juice is spread over it and treated in the same manner, and thus, successively, until blocks of crude rubber are made up of the required solidity and thickness. The clay form is then broken and the rubber sent to the native market from whence it is shipped to other countries. The Para rubber from Brazil is recognized as the best, but great quantities come from Africa and some is now obtained from cultivated trees in Mexico.

Rubber is insoluble in water and dilute acids or alkaloids, but is more or less soluble in chloroform, carbon disulphide, oil of turpentine, petroleum benzin and benzol. It melts at about 125°C. remaining soft and adhesive after cooling. Its solution in ether or benzol is used as an adhesive and for waterproofing fabrics; also in liquid form for mending rubber tires and soft rubber articles of all kinds.

Vulcanized Rubber and **Hard Rubber** are made by combining sulphur in various percentages with rubber and heating them together. Different degrees of hardness may be produced by using different proportions of sulphur and different temperatures. In the form of sheet rubber which is lightly vulcanized, many articles sold in drug stores are prepared, as water-bags etc. Another form is rubber mixed with some earthy substance and made into tubing or bulbs, such as syringes etc. Hard rubber, which is highly vulcanized, is made into hard rubber goods, syringes, combs, penholders, and a great variety of articles.

ELATERIUM. Br.

"A sediment from the juice of the fruit of *Ecballium Elaterium*." <Br. 1898.

This is obtained from the very nearly ripe squirting cucumber fruit by cutting the fruit lengthwise and lightly pressing out the juice, then straining through a hair-cloth sieve and setting aside to deposit. The supernatant liquid is then poured off, the sediment poured on a linen filter and dried by gentle heat on porous tiles. It requires about 40 pounds of the fruit to yield half an ounce of elaterium; it is therefore expensive and liable to adulteration.

Elaterium is used as a purgative or cathartic, especially in dropsical conditions. It is generally given in the form of pills or powders, but its solution in alcohol is more effective. The dose is from $\frac{1}{16}$ to $\frac{1}{20}$ grain, repeated if necessary.

Elaterinum, Elaterin. U. S. Br. A neutral principle extracted from elaterium by treating it with alcohol, evaporating the alcoholic tincture to the consistence of a thin oil, and pouring it while warm into a weak boiling solution of potassa. The elaterin crystallizes, leaving the green resin in solution. The dose is $\frac{1}{16}$ of a grain.

ELEPHANTOPUS TOMENTOSUS. Elephant's Foot.

The herb, (Fam. Compositæ), native of southern U. S. Diaphoretic, expectorant and emetic in large doses. Useful in asthma and bronchial catarrh. A fluid extract is prepared, dose $\frac{1}{3}$ to 2 Cc. (5 to 30 minims).

EMBELIA RIBES.

The fruit of a kind of currant grown in India, (Fam. Myrsinæ). A very large climbing vine which, when full grown, has a trunk 8 to 10 inches in diameter. The smooth, succulent, black berries, when ripe, are about the size of pepper and are carminative, stomachic and anthelmintic. Useful especially for removal of tape-worm.

A fluid extract is prepared from the fruit, dose 4 to 16 Cc. (1 to 4 fl.drachms).

EPHREDRA ANTISYPHILITICA. Teamster's Tea.

The twigs of a plant grown in Mexico and Arizona familiarly known in that country as "Whorehouse tea." It is esteemed as a remedy for venereal complaints and is especially recommended for gonorrhœa.

A fluid extract is prepared, dose 4 to 8 Cc. (1 to 2 fl.drachms).

EPIGÆA REPENS. Trailing Arbutus.

The leaves of trailing arbutus, also known as ground laurel and May-flower (Fam. Ericacæ).

This plant is found in woods in north America. It has evergreen leaves and in the early spring puts forth rose-colored fragrant flowers in small axillary clusters. Its leaves are inodorous, but have an astringent, bitter taste. Its action is astringent and diuretic. It is used for catarrh of the bladder, gravel etc., and in its action quite resembles uva-ursi.

A fluid extract is prepared, dose from 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

EPILOBIUM ANGUSTIFOLIUM. Willow Herb.

The leaves of the plant, (Fam. Onagraceæ), grown in the U. S. and Europe. It is chiefly astringent and demulcent. Useful in diarrhœas and leucorrhœa.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

EPIPHEGUS. Beech Drops.

The parasitic plant, Epiphigus Virginiana, which grows upon the root of the beech. A peculiar scaly plant found only about the roots of beech trees. Is astringent and useful in chronic diarrhœas and pulmonary or uterine hemorrhages.

A fluid extract is prepared, dose $\frac{2}{3}$ to 2 Cc. (10 to 60 minims).

EQUISTICUM. Horsetail.

The rush-like plant, (Fam. Equisetacæ), native of U. S., found in low moist shaded ground. It is astringent and diuretic. Useful in dropsy, suppression of urine and dysentery.

A fluid extract is prepared, dose 1 to 4 Cc. (15 to 60 minims).

ERGOT. U. S., Br. Ergot.

"The sclerotium of *Claviceps purpurea* (Fries), Tulsane (Fam. Hypocreacæ), replacing the grain of rye, *Secale cereale*, Linné (Fam. Graminæ)." <U. S.

"The sclerotium of *Claviceps purpurea*, Tulsane; originating in the ovary of *Secale cereale*, Linn." <Br.

This is a morbid growth which appears on occasional heads of rye, also appearing on other kinds of grain, taking the place of a regular kernel of the grain, and is familiarly known as "spurred rye." It has a peculiar odor and a sweetish taste, and a bluish-purple color externally.

Ergot is extensively used in medicine in a variety of forms. It seems to have a contractile effect upon the capillaries and is employed for contraction of the uterus during or after labor, in hemorrhages, for hemorrhoids and in

various conditions requiring contraction of the small blood vessels. An extract, fluid extract and wine of ergot are official in the U. S. P. The drug is seldom administered in powder.

A liquid extract is official in the Br., dose 10 to 30 minims.

The following preparations and principles have been obtained from ergot:

Ergotin, or **Bonjean's Ergotin**.—This is a purified extract of ergot of rather soft consistence. See *Extractum Ergotæ*. The dose is from 5 to 10 grains. This extract is used in many forms in medicine and, when properly diluted and combined, is the chief ingredient of a liquid used in an atomizer for asthma.

Ergotinine, crystallized. This is recently official in the Fr. Codex. It may be obtained by exhausting ergot, 1 kilogr. with 95% alcohol, 3 kilogms., by percolation, and adding caustic soda just sufficient to make slightly alkaline and then distilling off the alcohol. The residue after distillation is then agitated briskly for some time with ether 2 liters and allowed to rest quietly for some time. If the ether does not completely separate, a little solution of citric acid is added drop by drop until neutralized and complete separation occurs. The ether is then poured off and carefully agitated with a tenth of its volume of water and left to stand until the ethereal layer has separated. This is then carefully poured off and agitated with 10 grammes of citric acid dissolved in 30 grammes of water. The aqueous residues are then collected, concentrated and crystallized, and afterwards the crystals purified, neutralized and converted into the alkaloid.

This is used chiefly by hypodermic injection $\frac{1}{15}$ grain in solution.

Cornutein or **Ecboline** is another alkaloid obtained from ergot, having similar properties as the foregoing. The dose is $\frac{1}{8}$ grain 3 times a day.

Ergone. A liquid preparation of ergot made by P. D. & Co., intended for hypodermic use. 1 Cc. represents 1 gramme of ergot.

Ergotole. A liquid preparation made by S. & D., intended for hypodermic use. It is $2\frac{1}{2}$ times as strong as the U. S. fluidextract. Dose 5 to 20 minims.

Sclerotic Acid. **Ergotinic Acid**. (Kobert). This is claimed to be the chief active constituent of ergot, 1 grain representing 25 grains of ergot. Dose $\frac{1}{2}$ to 2 grains.

ERECHTHITES. Fireweed.

The herb, *Erechthites hieracifolia*, (Fam. Compositæ), native of U. S. and Canada. This weed springs up in newly-cleared and burnt-over fields. It is of aromatic odor and bitter acid taste. Its action is tonic and astringent, chiefly used in diarrhœas and hemorrhoids, both internally and locally. Its virtues reside mainly in the oil of fireweed which may be obtained from it by distillation.

A fluid extract is prepared with alcohol, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

ERIGERON. Fleebane.

The plant commonly called pride-weed or scabious or sweet scabious, (Fam. Compositæ), native of Europe and North America. It is diuretic, tonic and astringent. Useful in dropsies and urinary disorders. Its virtue resides in the volatile oil of *Erigeron* which may be obtained by distillation.

A fluid extract is prepared, dose 1 to 4 Cc. ($\frac{1}{4}$ to 1 fl.drachm).

ERIODICTYON. U. S. Yerba Santa.

"The dried leaves of *Eriodictyon Californicum*, (Hooker and Arnott); Greene (Fam. Hydrophyllacæ)." <U. S.

This is a low shrub, native of California and New Mexico, which has recently been made official in the U. S. P. It is commonly known as "yerba santa" and is used in the treatment of consumption and bronchial troubles, besides being made into an elixir and syrup with other drugs for the purpose of masking the taste of quinine and other bitter drugs. The aromatic leaves are used, and a fluid extract is official in the U. S. P.

ERYNGIUM. Button Snakeroot.

The rhizome of *Eryngium aquaticum*, (Fam. Umbelliferæ). Native of Europe and U. S. A plant having a tuberous root, odor aromatic, taste

sweetish-aromatic; diaphoretic, diuretic, expectorant. Uses same as senega, in bronchial trouble, dropsy and kidney diseases.

A fluid extract is prepared, dose 1 to 3 Cc. (15 to 45 minims).

ERYTHRONIUM. Adder's Tongue. Dog Violet.

The entire plant *Erythronium Americanum*, (Fam. Liliaceæ). Native of U. S. A small plant with spotted leaves, growing in moist rich woods. It has a corm at the bottom from which the two lily-like leaves proceed. It is diaphoretic and in large doses emetic. Mostly used green as a domestic remedy.

ERYTHROPHLÆUM. Sassa Bark. Mancona Bark.

The bark of the tree, (Fam. Leguminosæ). Native of Guinea. This bark has an astringent taste and in powder is sternutatory. It is useful in diarrhœas, colic and dropsy. Several native tribes use it as an ordeal bark.

A fluid extract is prepared, dose $\frac{2}{3}$ to 2 Cc. (10 to 30 minims).

ESCHSCHOLTZIA. California Poppy.

The plant, (Fam. Papaveraceæ), is very common in California and is somewhat used as a soporific and nerveine.

A fluid extract is prepared, dose 1 to 2 Cc. (15 to 30 minims).

EUCALYPTUS. U. S.

"The dried leaves of *Eucalyptus globulus*, Labillardière (Fam. Myrtaceæ)." <U. S.

This tree, of which there are many varieties, is an evergreen of Australia, but now domesticated in many other countries. It grows in warm, wet localities, often to a height of 350 feet, and is cultivated in malarial districts for the purpose of overcoming malarial emanations. The leaves are used in medicine, and eucalyptus oil, which somewhat resembles the oil obtained from the camphor tree, is distilled from them. A fluid extract of the leaves is official.

Average dose.—2 gm. (30 grains).

Eucalyptus Gum. Red Gum.—This is official in the Br. P. and is described as "A ruby-colored exudation, or so-called red gum, from the bark of *Eucalyptus rostrata*, Schlechtendal; and some other species. Imported from Australia." <Br.

This gum is called Australian kino, and very much resembles kino, except that it is much less astringent. It is used for diarrhœa or other conditions where a mild astringent is indicated. Dose, 2 to 10 grains.

Eucalyptol. $C_{10}H_{18}$. This is official in the U. S. P. It is the chief constituent of oil of eucalyptus, and is obtained during the distillation of the oil, by fractionating the portion that is distilled between 170°C. and 178°C. and purifying it by treating with calcium chloride and redistilling. It is identical in composition to Cajuputol, and is quite generally used in medicine instead of the ordinary oil of eucalyptus. It is a valuable ingredient in many solutions used in nebulizers and other spraying devices for the throat and nasal passages; and is used in many forms in remedies for bronchial troubles, also in antiseptic ointments and oil liniments.

EUONYMUS. U. S. Wahoo.

Euonymi Cortex. Br. Euonymus Bark.

"The dried bark of the root *Euonymus atropurpureus*, Jacquin (Fam. Celastraceæ)." <U. S.

The shrub is indigenous to the northern and northwestern U. S., and is commonly known as Wahoo, or by its Indian name, Waahoo, or "burning bush" from its abundant bright red flowers, or "spindle tree" from the use of its wood for making spindles. Its bark is a bitter tonic, laxative and cholagogue, and has been used with advantage for dropsy and similar conditions which require a hydragogue. An extract is official in the U. S., and a dry extract in the Br. P.

✓Average dose.—0.500 gm.=500 milligrammes (7½ grains).

A fluid extract is prepared with $\frac{2}{3}$ alcohol, dose 1 to 5 Cc. (15 to 75 minims).

Euonymin. A neutral principle which seems to possess the medicinal activity of the bark, and has been a favorite with the Eclectics. The dose is 1 to 3 grains.

EUPATORIUM. Boneset.

"The dried leaves and flowering tops of *Eupatorium perfoliatum*; Linné (Fam. Compositæ)." <U. S.

The herb grows in moist low ground throughout Canada and the northern U. S., several varieties being commonly used in domestic medicine. An infusion of the plant is an old-time household remedy of considerable value. A fluid extract is official, but it is more commonly given in the form of "boneset tea," as a diaphoretic and for influenza and rheumatism.

Average dose.—2 gm. (30 grains).

Eupatorin. A glucoside is obtained from it in the usual manner, but is little used in medicine.

EUPATORIUM PURPUREUM. Queen of the Meadow.

The root of a perennial, herbaceous plant, commonly known as Queen of the Meadow or Trumpet-weed (Fam. Compositæ).

This plant is found in northern U. S. and Canada. Its properties are diuretic, tonic, astringent and stimulant. It is used for dropsy, gravel, and chronic diseases of the urinary organs and rheumatism.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

Eupurpurin. The active principle of this plant. Dose 1 to 4 grains.

EUPHORBIA.

Under this general heading may be included several plants, native of different countries, somewhat used in medicine.

They are all somewhat irritant and have a stimulating effect on the mucous membrane and secretory organs.

Euphorbia corollata. Milk-weed or Wild-ipecac. The root of the plant found in the southern and western U. S.

It is cathartic, diaphoretic, expectorant, and in large doses emetic; locally the fresh root is applied as a vesicant.

It is employed in chronic bronchitis, catarrh of the bladder and dropsy.

A fluid extract is prepared, dose $\frac{1}{3}$ to 2 Cc. (5 to 30 drops).

Euphorbia drummondii. The entire plant of a species found in Australia. It has been employed for alcoholic or sexual excesses, and as a remedy for cigarette smoking.

Euphorbia heterodoxa. A plant found in Brazil, and known there as "alveloz." The milky juice is the part employed, which, when applied to the skin or mucous membrane, causes a suppuration. It has been employed as an application to morbid growth and in epithelioma.

Euphorbia ipecacuanha. Wild Ipecac. The root of a species common in the U. S. It is emetic, cathartic, diaphoretic, expectorant etc. It has been found valuable in chronic bronchitis, catarrh of the bladder etc.

Euphorbia pilulifera. Snake-weed. This plant from Australia is known as the pill-bearing spurge. The entire herb is used. It is an anti-spasmodic and nerve sedative.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

EUPHORBIIUM. Gum Euphorbium.

A substance containing about 18 percent. of gum and 38 percent. of resin, obtained from *Euphorbium resinifera*, found in Morocco. It is the concrete resinous juice of certain species of *Euphorbia*, believed to be similar to cactus, which, when incised or wounded, yields a milky juice that concretes on the surface to resinous tears about the size of a pea, in which form it is found in commerce.

It is used in irritating plasters, especially in veterinary practice, and in catarrh snuffs etc., being a powerful stenutatory.

FABÆ — BEANS.

The name beans or bean is applied commercially to the seeds or fruit of certain plants. Only a limited number of such seeds or fruits are known as beans, and in this work they are noted under the pharmaceutical title of the plants that produce them. Commercially the beans that are used in medicine are as follows: cacao, calabar, castor, croton, dive-dive, pichurin, St. Ignatius, St. John's (bread), tonca and vanilla.

FEL BOVIS. U. S. Ox-Gall.

"The fresh bile of *Bos taurus*, Linné." <U. S.

Ox-gall is the fresh fluid obtained from the gall-bladder of *Bos taurus*. In domestic medicine and the treatment of domestic animals, it is considerably used as an ingredient of liniments and lotions. In pharmacy it is used fresh as it is obtained and to prepare more permanent preparations of ox-gall, which are as follows:

Fel Bovis Inspissatum—Inspissated Ox-gall or bile.—Made by heating fresh ox-gall 100 parts (or 10 ounces) to a temperature not exceeding 80°C. (176°F.), straining through muslin, evaporating the strained liquid on a water-bath to 15 parts (or 1½ ounce). This is chiefly used as an ingredient in pills. Dose from 5 to 15 grains. This was formerly official in the U. S.

Fel Bovis Purificatum—Purified Ox-gall.—U. S.—Made by evaporating 300 Cc. (or 16 fl.ounces) of fresh ox-gall on a water-bath to about 100 gm. (or 5½ fl.ounces); then adding 100 Cc. (or 5 fl.ounces) of alcohol; agitating, and setting aside for 24 hours, then decanting and filtering, distilling off the alcohol and evaporating the residue to pilular consistence. The uses and dose are the same as the preceding.

The Br. P., under the Latin title *Fel Bovinum Purificatum*; common title Purified Ox-bile; directs 20 fl.ounces of fresh ox-bile to be evaporated to 4 fl.ounces and mixed with 8 fl.ounces of alcohol (90%), and treated in the same manner as the foregoing.

Fel Bovis Præparatus—Prepared Ox-gall.—The liquid ox-gall is frequently required in liniments, and, as the fresh ox-gall will not keep, the following formula for a permanent liquid preparation is presented:

Ox-gall, fresh, 16 ounces; alcohol 5 ounces; evaporate the ox-gall at a temperature not exceeding 80°C. (176°F.) to 12 fl.ounces; add the alcohol, allow to stand for 24 hours and decant the liquid.

FERMENTUM — YEAST.

The ferment obtained in brewing beer and by various other processes is a vegetable growth (*Cerevisiæ Fermentum*—which varies somewhat with the substance in which it is developed). It appears as a foam or froth upon the surface of the fermenting liquid, and is instrumental in converting the sugar of the solution into alcohol with the evolution of CO₂. It may be cultivated by the addition of a little yeast to any saccharine solution. It is extensively used in the manufacture of whisky from corn-meal, and for "starting" the fermentation of other liquors. It is used in medicine as a poultice for gangrene and ulcers and is given in diabetes. In the form of Vienna Yeast, which is prepared by fermenting an infusion of maize and rye with barley malt, and preserved in various other forms, it is a well-known article of household use. For this purpose it is prepared with canaille or meal, and pressed in cakes and dried, or is pressed moist into cakes and covered with tinfoil and sold as compressed yeast.

FICUS. U. S. Fig. Br. Figs.

"The partially dried fruit of *Ficus Carica*, Linné (Fam. Moraceæ)." <U. S.

"The dried fleshy receptacles of *Ficus Carica*, Linn." <Br.

Figs are used in medicine in the preparation of Confection of Senna, and are reputed to be laxative, but this effect is probably due to the mucilage and the seeds which act mechanically. The so-called Syrup of Figs which is extensively sold as a proprietary medicine derives its laxative effect from

other substances than figs. Fig Paste, which is a popular confection, rarely contains figs. The use of figs, however, as a demulcent and nutritive is advantageous.

FILIX MAS. Br. Male Fern.

"The rhizome of *Aspidium Filix-Mas*, Schwartz; collected in the autumn, divested of its roots, leaves and dead portions, and carefully dried." <Br.

This is described under the U. S. title *Aspidium*.

A liquid extract is official in the Br., dose 45 to 90 minims.

FLORES — FLOWERS.

Fleurs, Fr.; Blüthen, G.; Fiori, It.

In botany flowers are the blossoms of plants, and contain the organs of reproduction. A complete flower consists of the **calyx** which is the green (or sometimes other colored) envelope forming the cover of the flower-bud; the **corolla**, consisting of the bright colored leaves which expand when the flower opens, and the **stamens** (male), and **pistil** (female)—the reproductive organs.

In pharmacy flowers may consist of all or only a portion of the above mentioned parts,—some flowers being gathered entire, some only the petals being used, and some only the stamens.

In the U. S. and some of the European pharmacopœias only the name of the plant from which the flowers are obtained is given, as *arnica*, *anthemis* etc. In the Br. P. the Latin name of the plant is followed by the word "Flores," as *Anthemidis Flores*, and the common title has the name of the plant preceding the word "flowers," as *Chamomile Flowers*.

In some other pharmacopœias the Latin word *Flores* precedes the name of the plant, as *Flores Arnicae* etc.

As all of the U. S. and Br. P. Flowers are described in this work in the alphabetical order of subjects, and those not official are mostly noted elsewhere, they will not be further considered under this heading.

FÆNICULUM. U. S. Fennel.

Fœniculi Fructus. Br. Fennel Fruit.

"The dried, nearly ripe fruit of *Fœniculum Vulgare*, Miller (Fam. Umbelliferae)." <U. S.

"The dried ripe fruit of *Fœniculum capillaceum*, collected from cultivated plants." <Br.

This fruit, which is familiarly known as "Fennel seed," is a favorite flavoring in species; and oil of fennel, which is distilled from it, is much used as an aromatic ingredient in liquid medicines, particularly those prepared for children. A fixed oil is also obtained from it by expression, but it does not represent the aromatic properties of the seed to any great degree.

Average dose.—1 gm. (15 grains).

A fluid extract may be prepared from the seeds with 90% alcohol, dose 1 Cc. (15 minims).

FOLIA — LEAVES.

Feuille, Fr.; Blatter, G.; Foglie, It.; Hojas, Mex., Sp.

In botany leaves are the organs by which plants absorb gases which are converted into cellular tissue and other plant nourishment.

In pharmacy fresh or dried leaves are gathered and used for medicinal purposes, and the name is applied to all manner of leaves of plants, and sometimes to the petals of flowers.

In the U. S. and some of the European pharmacopœias only the name of the plant from which leaves are obtained is given, as *buchu*, *senna* etc. In the Br. P. the Latin name of the plant is followed by the word "Folia," as *Buchu Folia* etc., and the common title has the name of the plant preceding the word "leaves," as *Buchu leaves* etc. In some of the pharmacopœias the Latin word *Folia* precedes the name of the plant, as *Folia Buchu* etc.

As all of the U. S. and Br. P. leaves are described in this work in the alphabetical order of subjects, and those not official are mostly noted elsewhere, they will not be further considered under this heading.

FRANGULA. U. S. Buckthorn.**Rhamni Frangulæ Cortex. Br. Frangula Bark.**

"The bark of *Rhamnus Frangula*, Linné (Fam. *Rhamnaceæ*), collected at least one year before being used." <U. S.

The buckthorn, which is a species of alder, is native of Europe, the bark and berries both being employed as medicine. It is similar to the *Rhamnus purshiana* of the Pacific coast of North America, and possesses similar properties, but in a less degree. The bark has long been used as a laxative and cathartic, and is considerably used in laxative cordials. A fluid extract is official in the U. S. P.

Frangulin. $C_{25}H_{30}O_{10}$.—This glucosidal principle has been obtained from the bark, and seems to represent its cathartic properties, although it is not, as yet, sufficiently known to become prominent.

FRANKENIA. Yerba Reuma.

The herb *Frankenia grandiflora*, native of California (Fam. *Frankeniaceæ*).

This plant has a saline taste with an astringent after-taste. It is used in the form of a decoction for insufflation in catarrh and injection in the vagina and urethra.

A fluid extract is prepared, dose 10 to 20 minims. May be diluted with three or four parts of water and used as a gargle.

FRASERA. American Columbo.

The root of *Frasera Caroliniensis* (Fam. *Gentianaceæ*).

This root has properties similar to *Gentian* and *Calumba*, and is frequently used to adulterate the latter. It is a pure bitter tonic given for the same purposes as *gentian* or *calumba*.

Fraserin. An Eclectic concentrate prepared from American columbo, and claiming to represent the active properties of the root. Dose 1 to 3 grains.

FRAXINUS. Ash.

The bark of several species of Ash is employed in medicine (Fam. *Oleaceæ*).

Fraxinus Americana. White ash, native of U. S. and Canada. Stimulant to vaso-motor nerves; used chiefly for uterine congestions.

Fraxinus Excelsior. European ash, native of Europe and Asia, cultivated in U. S. Diuretic, astringent; used in rheumatism, gout and intermittent fever.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

Fraxinus Sambucifolia. Black ash, native of U. S. and Canada. Tonic and astringent. Used for dyspepsia and eczemas.

A fluid extract is prepared, dose 2 to 8 Cc. ($\frac{1}{2}$ to 2 fl.drachms).

All of the species of ash have the power of paralyzing snakes whenever they are brought in proximity to the tree or parts of the tree.

FRUCTUS—FRUITS.

Fruits, Fr.; Frucht, G.; Frutto, It.; Fruto, Mex., Sp.

In botany and pharmacy Fruit includes a great variety of the products of vegetation. In a botanical sense, fruit is the matured seed vessel and its contents and coverings. The peach and apple are examples of fleshy fruits; berries of various kinds are examples of another kind of fruits, nuts, another kind of fruits; the grains and a great variety of seeds are other kinds of fruit.

In the U. S. P. Fruit is generally given the name of the plant from which it is obtained, as Carum, Caraway etc.; but when leaves and seeds are both official they are designated, as *Stramonii Semen*, *Stramonium Seed* etc. In the Br. P. the name of the plant is followed by the word "Fructus" or "Semina," as *Carui Fructus*, Caraway Fruit; *Stramonii Semen*, *Stramonium Seed* etc.

In some of the other pharmacopœias the Latin word *Fructus* precedes the name of the plant, as *Fructus Carvi*, Caraway Fruit etc.

As all of the U. S. and Br. Fruits are described in this work in the alphabetical order of subjects, and those not official are mostly noted elsewhere, they will not be further considered under this heading.

FUCUS. Bladder-wrack.

A seaweed, *Fucus vesiculosus* (Fam. Fucaceæ). This seaweed is widely distributed along the shores of the Atlantic ocean and Great Britain. It has air bladders which support it on the surface, and from which it derives its common name. In medicine it is employed as a remedy for obesity, and has been an advertised ingredient in compounds for such purpose. The drug is properly given in the form of decoction, but a fluid extract claiming to represent its virtues is prepared, dose 1 to 4 Cc. ($\frac{1}{4}$ to 1 fl.drachm).

FUMARIA. Fumatory.

The leaves of *Fumaria officinalis* (Fam. Fumariaceæ). Native of Europe, cultivated in U. S. Bitter, acrid, saline taste. The plant is very succulent, yielding a juice which is used for constipation, torpid liver and dyspepsia. Dose of recent juice 4 to 8 Cc. (1 to 2 fl.drachms).

Fumarine. An alkaloid and Fumaric Acid are obtained from this plant.

GALANGA. Galangal.

The rhizome of *Alpenia officinarum*, Hance (Fam. Zingiberacæ).

There are two varieties of this plant, large and small. Their medicinal properties are similar, stimulant, aromatic, stomachic, like ginger. Commonly called China root from the country where it is chiefly obtained; sometimes called catarrh root. It promotes digestion, relieves flatulence and nausea.

Dose of grated root 1 to 2 gm. (15 to 30 grains).

A fluid extract is prepared, dose from 5 to 20 minims.

GALBANUM. Br. Gum Galbanum.

"A gum-resin obtained from *Ferula Galbanum*, and probably from other species." <Br.

This gum-resin is obtained from certain umbelliferous plants grown in Persia and the East. It is found in the market in masses of agglutinated yellowish tears containing about 20 percent. of gum, 65 percent. of resin, and 5 percent. of volatile oil. It is a valuable ingredient of plasters and is used in pills. Its resin, extracted by alcohol, yields resorcin by the same treatment as is employed with ammoniac; and by dry distillation Umbelliferone, $C_8H_6O_3$, which is the principle in gums, giving a blue color when dissolved with water and a little ammonia added, but is chiefly used externally as an ingredient of plasters. Galbanum is employed internally as an antispasmodic, in doses of 5 to 15 grains.

GALEGA OFFICINALIS. Goat's Rue.

The flowering herb, native of southern Europe. This plant is tonic, nervine and diuretic, and has recently come into favor as a galactagogue, being highly esteemed as a stimulant to the secretion of milk and the development of the mammary glands. It is chiefly used in the form of a fluid extract prepared with diluted alcohol. The dose of the fluid extract is 1 to 4 Cc. (15 to 60 minims).

Galegol. A concentrate prepared by extracting the medicinal principles of the drug, evaporating to dryness and mixing with milk sugar in the same manner as abstracts are made.

GALIUM. Cleavers. Bedstraw.

The herb *Galium aparine*, (Fam. Rubiacæ). Native of Europe and U. S. It has an acrid, bitter taste and is alterative, antiscorbutic and diuretic. It is used in scaly skin eruptions and in scrofula and scurvy.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

Galium Verum. Cheese rennet. A similar plant, native of Europe; having like properties, but more acid and bitter.

GALLA. U. S., Br. Nutgall. Galls.

"An excrescence on *Quercus infectoria*, Oliver (Fam. Cupuliferæ)." <U. S.
 "Excrescences on *Quercus infectoria*, Oliver; resulting from the puncture and deposition of an egg or eggs of *Cynips Gallæ tinctoriæ*." <Br.

Galls are obtained chiefly from Syria and Asia Minor and are known as Aleppo Galls, which is the name of the town from which they are mostly shipped.

These are used extensively in dyeing and making ink, and are the principal source of tannic and gallic acids, which see. Galls are strongly astringent, and an ointment made with finely powdered galls and lard was formerly official, being used for piles and sores where an astringent was indicated. A decoction of syrup of galls may also be used internally in diarrhoea and looseness of the bowels.

Average dose.—0.500 gm.=500 milligrammes (7½ grains).

A fluid extract is prepared with $\frac{2}{3}$ alcohol, dose 5 to 10 Cc. (1 to 2½ fl.drachms).

GARRYA. California Fever Bush. Skunk Bush.

The leaves of *Garrya Fremontii* (Fam. Cornaceæ).

This shrub is native of California. Tonic, febrifuge; used for malaria, dyspepsia and fevers.

A fluid extract is prepared, dose 3 to 5 Cc. (45 to 75 minims).

Garryine. A principle obtained from this plant, dose 1 to 3 grains.

GAULTHERIA. Wintergreen.

The leaves of *Gaultheria procumbens*, (Fam. Ericaceæ).

A very small shrub having an aromatic odor and astringent aromatic taste; fruit a small, round, red berry. It yields a volatile oil which is its chief medicinal constituent. It is much heavier than water, having sp. gr. 1.173. This oil is methyl salicylate. A similar oil is made from birch twigs, and also synthetically. It is employed in medicine as an antiseptic and anti-rheumatic, also as a popular flavoring for confectionery and compounds.

A fluid extract is prepared from the leaves, dose 4 to 8 Cc. (1 to 2 fl.drachms).

Essence of Wintergreen is prepared from the oil.

GELSEMIUM. U. S. Yellow Jasmine.**Gelsemii Radix. Br. Gelsemium Root.**

"The dried rhizome and roots of *Gelsemium sempervirens*, (Linné), Aiton filius (Fam. Loganiaceæ)." <U. S.

"The dried rhizome and roots of *Gelsemium nitidum*, Michaux." <Br.

This plant is a native of the southern United States, where it is found in forests climbing to the tops of tall trees. It is considerably used in medicine, the green plant extract being the most approved form of preparation. A tincture and fluid extract are also prepared from the dry root. It is employed in the treatment of fevers and paralysis. The dose of the fluid extract is 2 minims, gradually increased.

Average dose.—0.065 gm. (1 grain).

Gelsemin. The Eclectics use a powder precipitated from a concentrated alcoholic extract of the plant which seems to possess its medicinal properties.

Gelsemic Acid is also obtained from a concentrated fluid extract by evaporating it to about $\frac{1}{8}$ in volume of the weight of the drug originally taken, adding a little diluted hydrochloric acid to the residue, with water in volume as much as the original weight of the drug, filtering, shaking the filtrate with ether and allowing the etherial washings to evaporate spontaneously. The acid crystallizes in groups of long needles. After the etherial washings have been removed from the aqueous solution the residue may be concentrated and an alkaloid, **Gelseminine**, obtained in the usual manner. Gelseminine hydrochloride and Gelseminine sulphate are prepared by dissolving the alkaloids in the acids named, diluting with water, then concentrating.

GENTIANA. U. S. Gentian.**Gentianæ Radix. Br. Gentian Root.**

"The dried rhizome and roots of *Gentiana lutea*, Linné (Fam. Gentianaceæ)." <U. S.

"The dried rhizome and roots of *Gentiana lutea*, Linn." <Br.

The variety of gentian designated by the pharmacopœias grows in the cool elevated regions of Europe, but several other varieties, some of them native of the U. S. are found in the market.

It is a pure bitter tonic much used as a stomachic, and as an ingredient of medicines to stimulate the appetite and digestion. Several bitter principles have been obtained from gentian, but the favorite forms of administration are fluid extract and tincture, usually combined with aromatics.

Average dose.—1 gm. (15 grains).

A fluid extract is official, average dose 1 Cc. (15 minims).

The following substances have been isolated from gentian, but are seldom used:

Gentiopicroin, $C_{20}H_{30}O_{12}$; gentianin or gentisin, $C_{14}H_{10}O_5$; gentisein, $C_{13}H_8O_6$; and a sweet principle named gentianose, $C_{10}H_{16}O_6$, besides several derivatives of these principles.

GERANIUM. U. S. Cranesbill.

"The dried rhizome of *Geranium maculatum*, Linné (Fam. Geraniaceæ).." <U. S.

This plant is found in low grounds and scattered woods, throughout the northern and middle U. S. It is used chiefly as an astringent in diarrhœa, dysentery and cholera infantum, also in leucorrhœa, gleet etc. The fluid extract is official in the U. S. P.

Average dose of powder.—1 gm. (15 grains).

Geraniin. A principle is obtained by precipitating a concentrated extract of the drug in the usual manner, and has been somewhat used in Eclectic practice; it is chiefly tannin with a little resin and oleo-resin.

GEUM. Water Avens.

The rhizome and roots of *Geum rivale* (Fam. Rosaceæ).

A perennial plant found in North America and Europe. An astringent tonic, useful in diarrhœas and relaxed conditions of the mucous membrane.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

Geum Urbanum. European Avens. This plant is a native of Europe, quite similar to the foregoing. Its medicinal properties and uses are the same.

GILLENIA. Indian Physic.

The rhizome and roots of *Gillenia trifoliata* (Fam. Rosaceæ).

This drug resembles ipecac in its action. It is diaphoretic and expectorant in small doses. In large doses a mild emetic.

A fluid extract is prepared, dose 10 to 40 minims.

Gillenia stipulaceæ. American Ipecac. A similar plant, found in western and southern U. S., having bitter properties. Used the same as the foregoing.

Gillenin. A principle obtained from this drug giving a blood-red color with nitric acid. Dose 1 to 3 grains.

GLANDULÆ SUPRARENALES SICCÆ. U. S.**Desiccated Suprarenal Glands.**

"The suprarenal glands of the sheep (*Ovis aries*, Linné), or ox (*Bos taurus*, Linné), freed from fat, and cleansed, dried, and powdered." <U. S.

This is a light yellowish-brown amorphous powder having a slight, characteristic odor, partially soluble in water. One part of the powder represents about six parts of fresh glands freed from fat.

The uses of the suprarenal glands in the vital processes are not yet well determined. Two theories are prevalent, one is that the gland destroys certain

poisonous compounds occurring from decomposition of nitrogenous matter in the system, the other is that they regulate or control the pressure of the blood flowing to the kidneys and secrete certain active substances necessary to the health of the organism. One thing is certain that preparations derived from these capsules are useful in controlling the blood supply and arresting hemorrhage from the tissues.

Average dose—0.250 gm.=250 milligrammes (4 grains).

Adrenaline. Suprarenaline. Takamine, who has been most instrumental in bringing this alkaloid to public notice gives the formula as $C_{10}H_{15}NO_3$. It is usually administered subcutaneously, in a 1% solution as a local hæmostatic. It is also recommended for Addison's disease, asthma and all conditions in which there is an abnormal pressure of blood to any part of the system. It will be further noticed in Part II.

GLANDULÆ THYROIDEÆ SICCÆ. U. S.

Desiccated Thyroid Glands.

Thyroideum Siccum. Br. Dry Thyroid.

"The thyroid glands of the sheep (*Ovis aries*, Linné), freed from fat, and cleaned, dried and powdered." <U. S.

"A powder prepared from the fresh and healthy thyroid gland of the sheep." <Br.

A yellowish amorphous powder, having a slight, peculiar odor, and containing the active ingredient of the thyroid tissue; partially soluble in water. One part of the powder represents about five parts of the fresh glands.

The functions of the Thyroid Glands are not as yet definitely understood. The dried glands are supposed to be alterative, antifat and hemostatic, and to be useful in myxedema, obesity, struma and obstinate hemorrhage. It is known that when these glands are removed weakness and decline of all the vital functions follow with swelling of the body and thickening of the skin.

Average dose.—0.250 gm =250 milligrammes (4 grains).

Thyroglandulin is the mixed powders obtained from the glands said to be particularly useful in goiter and obesity.

Thyroidin is another name for the dried, sheep's thyroid, made uniform 1 part equal to 6 of the fresh thyroid. The dose of this powder is $\frac{1}{2}$ to 2 grains.

GLECHOMA. Ground Ivy.

The herb *Glechoma hederaceæ*, (Fam. Labiata). Native of Europe. A creeping vine with balsamic odor, bitter acrid taste, stimulant, tonic and aperient. Useful in chronic lung troubles and catarrh of the bladder.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

GLYCYRRHIZA. U. S. Licorice Root.

Glycyrrhiza Radix. Br.

"The dried rhizome and root of *Glycyrrhiza glabra*, Linné (Spanish Liquorice), or of *Glycyrrhiza glandulifera*, Waldstein and Kitaibel (Russian Liquorice); (Fam. Leguminosæ)." <U. S.

"The peeled root and peeled subterranean stem of *Glycyrrhiza glabra*, Linn., and other species." <Br.

This root which is a familiar and necessary article of drug stock is obtained chiefly from Italy, Spain, Russia and Turkey; the Italian being the sweetest and the Russian the most bitter.

The root is cut and used in species, and is ground, the finer particles being sifted out for powdered liquorice and the remaining fibrous substance being known as "Liquorice Wool." Powdered liquorice is used as a dusting for pills, and for many other purposes. The cut or ground root is used as an ingredient in many preparations, and is particularly useful for covering the taste of bitter drugs.

A fluid extract is official, average dose 2 Cc (30 minims).

A liquid extract is official in the Br., dose $\frac{1}{2}$ to 1 fl.drachm.

Glycyrrhizin. $C_{24}H_{36}O_{16}$. This is a principle obtained from the root, and is classed with the glucosides. It is not readily soluble in water, but dissolves freely in alcohol.

Glycyrrhizinum Ammoniatum. U. S. Ammoniated Glycyrrhizin.—This is prepared from liquorice root by percolating it with diluted ammonia water, adding sulphuric acid to precipitate, washing the precipitate, then adding sufficient ammonia water to dissolve, and drying the solution on glass so that, when dry, the product may be obtained in scales. As this is an official preparation of the U. S. P. the formula is given in full in Part II.

GNAPHALIUM. Life Everlasting.

The flowering herb of *Gnaphalium polycephalum*, Linné (Fam. Compositæ).

A fragrant, aromatic, bitter drug found in North America. Used for chronic bronchitis, diarrhoea etc.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

GOSSYPIUM. Br. Cotton. Cotton Wool.

"The hairs of the seed of *Gossypium barbadense*, Linn., and of other species of *Gossypium* freed from fatty matter." <Br.

This is the natural cotton official in the Br. P. In the U. S. P. Purified cotton is directed and as is properly a preparation it will be more fully described in Part II.

Cotton is used in pharmacy as a plug in funnels for filtering many liquids, and has been employed as an absorbent medium for oils in making aromatic waters.

GOSSYPII CORTEX. U. S. Cotton Root Bark.

"The bark of the root of *Gossypium herbaceum*, Linné; or of other cultivated species of *Gossypium* (Fam. Malvaceæ)." <U. S.

The bark of cotton root grown in the southern United States and in the sea islands is used as medicine, a fluid extract being official in the U. S. P. It is reputed to have emmenagogue properties and to promote uterine contraction like ergot, and to be useful in arresting hemorrhage. No important principle has been isolated from this drug. The dose of the fluid extract is $\frac{1}{2}$ to 1 fl.drachm.

Cotton Seed Oil is obtained from the seeds of the plant by expression and the hairs of the seed, which are known as Cotton are of great industrial importance.

GOSSYPIUM PURIFICATUM. U. S. Purified Cotton.

"The hairs of the seed of *Gossypium herbaceum*, Linné; and of other species of *Gossypium* freed from the adhering impurities and deprived of fatty matter." <U. S. (See Part II.).

GOUANIA. Chewstick.

The bark of *Gouania domingensis* (Fam. Rhamnaceæ). Found in the West Indies. It is an aromatic, bitter, tonic and astringent. Used in general debility; locally by chewing, and as a remedy for spongy gums. It is recommended to cure the tobacco habit when chewed in place of tobacco.

A fluid extract is prepared, dose 4 to 12 Cc. (1 to 3 fl.drachms).

GRANATUM. U. S. Pomegranate.

Granati Cortex. Br. Pomegranate Bark.

"The bark of the stem and root of *Punica Granatum*, Linné (Fam. Punicaceæ)." <U. S.

"The dried bark of the stem and root of *Punica Granatum*, Linn." <Br.

The bark of the stem and root of pomegranate which is employed as medicine, is chiefly imported from Europe and Asia, but the tree is cultivated in all civilized countries where the climate will admit. It attains its greatest perfection in the West Indies and most of the bark imported to this country comes from there.

It is used chiefly as a remedy for tape-worm, for which it has been proven quite effective. It is best given in the form of decoction, first macerating 2 ounces of the bark in a pint of water for 24 hours, then bringing to a boil and adding enough water to make a pint of the finished decoction. Of this one-fourth may be taken at once and followed every half hour with one or two ounces more as the patient can stand. It causes nausea and dizziness, but the effect is not alarming and the worm is generally discharged within a few hours after taking the medicine.

A fluid extract is prepared with diluted alcohol, dose 2 to 5 Cc. (30 to 75 minims).

Pelletierine, $C_8H_{13}NO$, is a liquid alkaloid supposed to represent the activity of the bark; being strongly basic it combines with acids, forming salts; the sulphate and tannate being the most desirable. This is an expensive alkaloid, as only 4 parts are obtained from this drug, other principles are obtained from pomegranate bark but are not considered so effective as pelletierine. **Pelletierine tannate** is the preparation of the alkaloid most generally used; the dose being from $\frac{1}{2}$ to 1 grain.

GRATIOLA. Hedge Hyssop.

The herb *Gratiola officinalis*, native of Europe (Fam. Scrophulariaceæ). A hydragogue cathartic used in dropsy.

A fluid extract is prepared, dose 1 to 2 Cc. (15 to 30 minims).

GRINDELIA. U. S. Grindelia.

"The dried leaves and flowering tops of *Grindelia robusta*, Nutall; or of *Grindelia squarrosa* (Pursh) Dunal (Fam. Compositæ)." <U. S.

This plant is found on the western side of both North and South America, but the source of supply for the United States comes chiefly from California and Mexico. It is an herbaceous plant growing from one to three feet high, but only the flowering top and leaves are used in medicine. Of the two varieties named as official there is but little difference in medicinal activity. The value of the plant seems to reside in the resinous exudation that may be obtained from the leaves and flowers. It closely resembles the exudation from pine, but having a different odor. Medicinally the plant is useful in asthma and bronchitis, acting as an antispasmodic and stimulant to the affected organs. It is also employed in whooping cough, and, like other terbinthine medicines, it is valuable in catarrhal diseases affecting the mucous membrane, either of the air passages or the renal tract. It is quite generally prescribed in the form of fluid extract, which is official in the U. S. P.

Average dose.—2 gm. (30 grains).

GUACO ROOT.

The root of a climbing vine found in Mexico and Central America, species unidentified. Used by the natives for the cure of serpent bites and highly recommended as a specific for rheumatism, used internally in the form of a fluid extract and externally applied.

A fluid extract is prepared, dose 1 to 2 Cc. (15 to 30 minims).

GUAIACI LIGNUM. Br. Guaiacum Wood.

"The heart-wood of *Guaiacum officinale*, Linn., or *Guaiacum Sanctum*, Linn." <Br.

This was official in the U. S. P. 7th revision, but was dismissed in the 8th. It is still official in many pharmacopœias.

The tree grows in the West Indies and the Bahama Islands, and along the coast of the adjoining continent. The wood is known commercially as "*Lignum Vitæ*," and is considerably used for making handles and for mallets and other implements in which a tough, hard, heavy wood is desirable. For use in pharmacy the wood, as usually imported, should be deprived of sap-wood and the heart-wood reduced to chips, raspings or shavings.

The rasped wood was formerly an ingredient in the U. S. Compound Syrup of Sarsaparilla, and is still considerably used in blood purifiers, and for rheumatism, scrofula and syphilis.

A fluid extract is prepared with alcohol, dose 2 to 5 Cc. (30 to 75 minims).

GUAIAIACUM. U. S. Guaiac.

Guaiaci Resina. Br. Guaiacum Resin.

"The resin of the wood of *Guaiacum officinale*, Linné; or of *Guaiacum sanctum*, Linné (Fam. Zygophyllaceæ)." <U. S.

"The resin obtained from the stem of *Guaiacum officinale*, Linn; or of *Guaiacum sanctum*, Linn." <Br.

The resin is obtained either as a natural exudate, or by tapping the trunk of the tree, or by heating billets of wood, or by boiling the sawdust or chips in water.

It is used chiefly in the form of tincture or ammoniated tincture, and is the source of several principles and acids that have attracted some attention in the medical world. Guaiacol was formerly obtained from this resin and has lately come into much prominence, but is now chiefly produced from beechwood creosote. Guaiaretic Acid, $C_{20}H_{26}O_4$; Guaiacic Acid, $C_{12}H_{16}O_6$; Guaiacene, C_8H_8O ; Pyroguaiacin, $C_{20}H_{14}O_6$, and some other substances are obtained from it.

It is used for purposes similar to those of the wood, but as it is soluble in alcohol and in alkalies, it is more convenient for administration. The dose of the powdered resin is from 10 to 30 grains.

GUARANA. U. S. Guarana.

"A dried paste chiefly consisting of the crushed seeds of *Paullinia Cupana*, Knuth (Fam. Sapindaceæ); yielding, when assayed by the process given, not less than 3.5 percent. of its alkaloidal principles." <U. S.

The woody climber from the fruit of which this paste is made grows in Brazil. The paste is prepared by the native Indians of the country in which the plant is found. The seeds are first shelled and well washed, and then roasted for five or six hours. Their external shells are then removed by beating them in a sack with clubs, and the coarse powder of the interior is mashed in a mortar with a little water to pasty mass which is kneaded and shaped into cylindrical masses like a small link of sausage. These are then dried in the sun or by a slow fire. Powdered guarana is used as an ingredient in headache powders, and the fluid extract is official in the U. S. P. The dose is 30 to 90 minims.

Guaranine. The chief medicinal constituent is claimed to be identical with caffeine and thein, and five percent. is obtained from an average quality of guarana. It may be prepared by mixing one part of calcined magnesia with five parts of powdered guarana, moistening with water and after standing 24 hours percolating in a water-bath percolator with hot chloroform until the drug is exhausted, then distilling off the chloroform, boiling the residue in water, filtering the decoction and evaporating it over sulphuric acid and crystallizing. This is used for the same purposes as caffeine.

GUTTA-PERCHA.

The hardened milky juice from the trunks of the trees *Isonandra gutta*, Hooker (Fam. Sapotaceæ).

This is a substance somewhat similar to India Rubber, insoluble in water or alcohol, but soluble in chloroform, oil of turpentine or carbon disulphide. It is used as an ingredient in plasters to render them adhesive, also in colodion as a protective application.

It is prepared in the form of sheets which are used as splints for fractures, being softened by the heat it adapts itself to the contour of the limb.

GYNOCARDIA ODORATA. Chaulmoogra.

The seeds of this East Indian plant, (Fam. Bixaceæ), are contained in its succulent fruit, and yield by expression a fixed oil highly recommended as an

alterative and tonic for rheumatism, scrofula, cutaneous diseases, leprosy and many other diseases. It is used internally and externally.

Dose of the oil, $\frac{2}{3}$ to 2 Cc. (10 to 30 minims).

HÆMATOXYLON. U. S. Logwood.

Hamatoxyli Lignum. Br. Logwood.

"The heart-wood of *Hæmatoxylon Campechianum*, Linné (Fam. Leguminosæ)." <U. S.

The tree from which this wood is obtained is a native of Campeachy and other states along the Bay of Honduras in Central America. The heart-wood is cut in chips or ground to a coarse powder, and is extensively used for coloring black and for making ink. An extract is prepared from the wood by percolating it with boiling water and concentrating the percolate. It is somewhat used in medicine as a mild astringent, particularly in cholera infantum. The dose of the extract, which is the only official preparation, is from 10 to 20 grains.

A fluid extract is prepared with diluted alcohol, dose 2 to 5 Cc. (30 to 75 minims).

Hæmatoxylin or **Hématin**. This is the coloring principle of the wood. It is obtained by treating the aqueous extract with alcohol, filtering and evaporating the tincture until it begins to thicken; then adding a little water and slowly evaporating, and allowing the liquid to cool and crystallize. It has the properties of the wood in a condensed form.

HAMAMELIS. Witch Hazel.

The bark and leaves are official in the U. S. and Br.

This shrub is found throughout the United States on stony soil and along the banks of streams; but it is most abundant in Mass., Conn., and northern New York, where the twigs are extensively distilled and the product sold as "Distilled Witch Hazel" or "Distilled Extract of Witch Hazel."

The plant possesses sedative and astringent properties, which are present in a measure in the distilled extract, but are more pronounced in the leaves and bark, from which fluid extracts are made.

Hamamelidis Folia. U. S., Br. Hamamelis Leaves. Witch Hazel.

"The dried leaves of *Hamamelis Virginiana*, Linné (Fam. Hamamelaceæ), collected in the autumn." <U. S.

"The leaves, fresh and dried, of *Hamamelis Virginiana*, Linn." <Br.

Average dose.—2 gm. (30 grains).

A fluid extract of the leaves is official in the U. S. P. and a liquid extract in the Br. P.

Hamamelidis Cortex. U. S., Br. Hamamelis Bark.

"The bark and twigs of *Hamamelis Virginiana*, Linné (Fam. Hamamelidaceæ)." <U. S.

"The dried bark of *Hamamelis Virginiana*, Linn." <Br.

This is used more particularly for its astringent properties, in chronic diarrhœas, hemorrhoids etc., and in the form of infusion for relaxing conditions and as an injection.

Average dose.—2 gm. (30 grains).

A liquid extract of hamamelis leaves is official in the Br., dose 5 to 15 minims.

The distilled extract of hamamelis or witch hazel is prepared from the twigs, gathered in the season of blossoming.

The distilled extract of *Hamamelis* prepared from the twigs when in bloom is the most popular form in which this drug is received.

HEDEOMA. U. S. Pennyroyal.

"The dried leaves and flowering tops of *Hedeoma pulegioides*, (Linné), Persoon (Fam. Labiata)." <U. S.

This is a small shrub of the mint family, common throughout the United States. Its properties reside in the volatile oil, which may be obtained by steam distillation.

The plant is used considerably in domestic practice in the form of a warm tea, for influenzas and at the menstrual period.

Average dose.—8 gm. (120 grains).

A fluid extract may be prepared with 90% alcohol, dose 2 to 5 Cc. (30 to 75 minims).

HEDERA HELIX. English Ivy.

The leaves of the creeping vine, native of Europe. They have a balsamic odor and the berries have a sour, pungent taste. The plant yields an alkaloid something like quinine, named **Hederine**, and a glucoside resembling saponin. It is given in pulmonary affections and wasting diseases of children and the fresh leaves, bruised, applied locally to ulcers and sores.

HELIANTHELLA.

The root of *Helianthella tenuifolia*, (Fam. Compositæ), southern U. S. This is diuretic, antispasmodic and expectorant. It is useful in asthma, chronic bronchitis, consumption and dropsy.

A fluid extract is prepared, dose $\frac{1}{3}$ to 2 Cc. (5 to 30 minims).

HELIANTHEMUM. Frostwort.

The herb *Helianthemum canadense* (Fam. Cistaceæ); northern U. S. and Canada. It is alterative and astringent, useful in scrofula and blood diseases, also in diarrhœa, and as a gargle in sore throat.

A fluid extract is prepared, dose $\frac{1}{3}$ to 1 Cc. (5 to 15 minims).

HELIANTHUS. Sunflower.

The seeds of *Helianthus annuus* (Fam. Compositæ). They are reputed to be valuable in the treatment of asthma. The bruised seeds 2 ounces, in a pint of whisky or gin makes a domestic remedy for asthma, and for kidney troubles. The seeds, crushed and pressed yield a bland oil like olive oil, dose 15 to 20 minims, or more; said to be a valuable remedy for gall stones.

HELLEBORUS. Black Hellebore.

This was formerly official in the U. S. P., but was dismissed in the 1880 revision. The root is the part generally used, and a fluid extract is prepared by manufacturers. It acts as a drastic cathartic and is given as an emmenagogue. It is given in epilepsy, dropsy and amenorrhœa. The dose of the powdered root is from 10 to 20 grains.

Helleborein. $C_{26}H_{44}O_{15}$. This principle represents the activity of hellebore. It is a crystalline glucoside, freely soluble in water; its action is similar to that of digitalis, and it is also a local anæsthetic said to be superior to cocaine.

Helleborus Alba. White Hellebore. The powdered root is extensively used as a dusting powder for killing currant worms.

HELONIAS. False Unicorn.

The dried root of *Chamælririum luteum*, Gray; *Helonias dioica*, Pursh. (Fam. Melanthaceæ). Native of eastern North America. It is commonly called Devil's Bit, Blazing Star or Starwort. Some confusion exists because of the similarity of names and appearance between this plant and *Alettris*, the true Unicorn root. *Helonias* is a diuretic, tonic and anthelmintic.

A fluid extract is prepared, dose $\frac{2}{3}$ to 2 Cc. (10 to 30 minims).

Chamælririn. A bitter principle obtained from this root.

Helonin. A concentrate prepared from this root, used by Eclectics, dose 1 to 2 grains.

HEMIDESMI RADIX. Br. Hemidesmus Root.

"The dried root of *Hemidesmus indicus* (Asclepiadaceæ)." <Br.

This is commonly known as Indian Sarsaparilla, and in India takes the place of sarsaparilla. It is also considerably used instead of sarsaparilla in Great Britain as a blood purifier and alterative. A glucoside, hemidesmin; and an acid, hemidesmic acid; have been obtained from the root. A syrup is official in the Br. P.

A fluid extract is prepared with diluted alcohol, dose 2 to 5 Cc. (30 to 75 minims).

HEPATICA. Liverwort.

The herb or leaves of *Hepatica triloba* (Fam. Ranunculaceæ). This is one of the earliest of the spring plants, found in open woods through the northern U. S. It has a bitterish, astringent taste, and is used as a diuretic and a tonic for the liver. It became popular some time ago because of its supposed use in Warner's Safe Kidney and Liver Cure.

A fluid extract is prepared, dose 4 to 8 Cc. (1 to 2 fl.drachms).

HERACLEUM. Cow Parsnip.

The root, leaves and fruit of *Heracleum lanatum* (Fam. Umbelliferae). Native of northern and middle U. S. It has a pungent, acrid taste, and is stimulant, carminative and antispasmodic. Used for dyspepsia, flatulence, colic etc.

A fluid extract is prepared, dose 1 to 4 Cc. ($\frac{1}{4}$ to 1 fl.drachm).

HERBÆ — HERB.

Sommités fleurs, Fr.; Erba, It., Yerba, Sp.

The name "herbs" is given to small plants which are gathered when in flower and either the whole plant or the flowering tops used. A great number of plants are designated as herbs in foreign pharmacopœias, but in the U. S. and Br. P. they are known only by the name of the plant.

As all which are official in the U. S. and Br. are noted in the alphabetical order of subjects and most others are mentioned somewhere in this work, no further reference will be made to them under this heading.

HEUCHERA. Alum Root.

The root of *Heuchera Americana* (Fam. Saxifragaceæ), native of U. S. It is astringent and is used chiefly in diarrhoeas and hemorrhages internally or as an astringent application to ulcers and for hemorrhoids, also as a gargle and mouth-wash.

A fluid extract is prepared, dose $\frac{3}{4}$ to 2 Cc. (10 to 30 minims).

HIERACIUM. Hawkweed.

The plant, *Hieracium Venosum*, (Fam. Compositæ). Native of North America. Its taste is acrid and bitter. It is alterative and reputed to cure the bites of venomous snakes. Useful in scrofula and catarrhs.

A syrup is prepared, dose 4 to 8 Cc. (1 to 2 fl.drachms).

HIRUDO. Br. Leeches.

"1. *Sanguisuga medicinalis*, Savigny; the Speckled Leech; and 2. *Sanguisuga officinalis*, Savigny; the Green Leech." <Br.

The leech is an aquatic worm which has been used by medical practitioners many centuries. Its application is a convenient method of drawing blood from an indurated or affected part. The leech is applied to the part and sucks out the blood; when full another leech is applied, if necessary, and the application repeated until the extraviated blood is removed.

HOANG-NAN. Tropical Bindweed.

The bark of *Strychnos gaultieriana* (Fam. Loganiaceæ), a climbing plant like clematis, found in the Molaccas. It has properties similar to nux vomica and yields alkaloids, brucine and strychnine, similar to *Strychnos* trees. It is reputed to be useful in leprosy and for the treatment of skin diseases. Dose of powdered bark 3 grains. A concentrated tincture is prepared, 1:4. Dose 3 to 10 minims.

HUMULUS. U. S. Hops.

(*Lupulus*. Br. Hops).

"The carefully dried strobiles of *Humulus Lupulus*, Linné (Fam. Moraceæ)." <U. S.

Hops are cultivated in nearly every part of North America and Europe, and are extensively used in making beer, ale, porter, and other malted beverages,

In medicine hops are recognized as tonic and nervine, the tincture being official in the U. S., Br., and most of the foreign pharmacopœias.

Hops are used as a fomentation to relieve pain and neuralgia, and pillows of hops are sometimes used to promote sleep.

A fluid extract is prepared with 90% alcohol, dose 2 to 5 Cc. (30 to 75 minims).

Lupulin. A bitter principle of a resinous nature has been obtained from hops and is considerably used by the Eclectics. It should not be mistaken for lupulin which is a yellowish powder or dust similar to pollen, obtained from the strobiles. This is explained under the heading *Lupulinum*, which see.

HYDRANGEA. Seven Barks.

"The root of *Hydrangea arborescens*, Linné (Fam. Saxifragaceæ). Northern U. S. Its action is diuretic and it is used to relieve gravel and catarrhal conditions of the bladder and urinary passages. It is considerably used in compounds.

A fluid extract is prepared, dose 2 to 5 Cc. (30 to 75 minims).

A proprietary medicine known as "Seven Barks" is chiefly a fluid extract of *Hydrangea*.

HYDRASTIS. U. S. Golden Seal.

Hydrastis Rhizoma. Br. *Hydrastis Rhizome.*

"The dried rhizome and roots of *Hydrastis canadensis*, Linné (Fam. Ranunculaceæ); yielding, when assayed by the process given, not less than 2 percent. of hydrastine." <U. S.

"The dried rhizome and roots of *Hydrastis canadensis*." <Br.

This plant, which is commonly known as "Golden Seal," is found chiefly in western and north-western United States in woodlands. It was used by the Indians for staining yellow and for dyeing. It is a favorite remedy for catarrhal conditions of the mucous membrane and is used in dyspepsia, liver complaints, catarrh of the stomach and bowels, nasal catarrh, leucorrhœa, gonorrhœa etc. A variety of preparations of it are made both to take and use for injections, and the powdered root is often used in snuffs and douches for catarrh.

Average dose of the powder, 2 gm. (30 grains).

A fluid extract is official in the U. S., average dose 2 Cc. (30 minims).

A liquid extract is official in the Br.

A Fluid *Hydrastis* is furnished by certain manufacturing chemists, and is a very popular preparation of this drug.

Hydrastine. U. S. An official alkaloid obtained from *Hydrastis*. This is the important principle obtained from this root. It is very insoluble in water but several salts are prepared from it by combination with acids which are much more soluble, and are therefore, more generally preferred in medicine. This alkaloid and its combinations will be further noticed in Part II.

HYOSCYAMUS. U. S. Henbane.

Hyoscyami Folia. Br. *Hyoscyamus Leaves.*

"The dried leaves and flowering tops of *Hyoscyamus Niger*, Linné (Fam. Solanaceæ); collected from plants of the second year's growth and yielding, when assayed by the process given, not less than 0.08 percent. of mydriatic alkaloids." <U. S.

"The fresh leaves and flowers, with the branches to which they are attached, of *Hyoscyamus niger*, Linn.; also the leaves and the flowering tops, separated from the branches and carefully dried. Collected from the flowering biennial plants." <Br.

This plant, which is commonly called "henbane," is a large herb having an offensive odor, which grows as a weed on waste ground throughout the northern and western United States, and throughout northern and central Europe. Its tinctures and fluid extracts are considerably used in medicine; also the solid extract prepared from the fresh or dried tops, and *hyoscyamus*

oil, which is an infusion of the fresh plant in olive oil. The root and seeds are also used in medicine. The average dose of the powdered leaves is 0.250 gm.=250 milligrammes (4 grains), but the fluid preparations or the solid extract are generally given. Its properties are similar to belladonna.

A fluid extract is official in the U. S., average dose 0.2 Cc. (3 minims).

Extract of hyoscyamus is official in the U. S. Green extract of hyoscyamus is official in the Br.

Several plants of the Solanaceæ yield alkaloids chemically identical with Hyoscine, from which official salts are prepared. As these are chemical compounds of this basic alkaloid with acids they will be considered in Part II. under the title Hyoscine, which see.

HYPERICUM. St. John's Wort.

The flowers of *Hypericum perforatum* (Fam. Hypericaceæ), found in Europe and the U. S. It has a balsamic odor and an astringent taste. It is diuretic and emmenagogue; used in chronic catarrh of the lungs, bowels or bladder.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

HYSSOPUS. Hyssop.

The flowering plant of *Hyssopus officinalis*, Linné (Fam. Labiatae); mostly cultivated in gardens. It has an aromatic camphorous taste and odor, and yields a volatile oil. It is employed in medicine as a stomachic, tonic and stimulant, also as a gargle and is used externally steeped with water or vinegar as an application for bruises and rheumatism.

A fluid extract is prepared, dose 4 to 8 Cc. (1 to 2 fl.drachms).

ICHTHYOCOLLA. Isinglass. Fish Glue.

"The swimming-bladder of *Acipenser Huso*, Linné; and of other species of *Acipenser* (Class Pisces; order Sturiones)." <U. S. 7th revision. Dismissed from the 8th.

This is commonly known as fish glue, and is prepared from the bladders of various kinds of sturgeon. The Russian isinglass is the kind directed in the pharmacopœia, but as that is very expensive, it is little used. That occurs in pieces or sheets of $\frac{1}{16}$ of an inch or more in thickness, while the common fish glue or isinglass, which is mostly sold, is in sheets of the thickness of paper, and is mostly made in New England from other species of fish than the sturgeon. The bladders of the cod produce an isinglass nearly as good as the Russian, and it is obtained in considerable quantities from Newfoundland.

Isinglass is used extensively for making a fine quality of glue and for preparing a nutritious jelly for invalids. It is also considerably used for fining wines and cordials.

IGNATIA. St. Ignatius Bean.

The seed of *Strychnos Ignatii*, Bergius (Fam. Loganiaceæ).

This is a climbing shrub or tree found in the Philippine Islands, having a smooth whitish fruit with a woody rind and containing 18 to 20 seeds in dry medulla. The seeds are from 1 to $1\frac{1}{4}$ in. long, brownish, very hard and horny; they are odorless but have an intensely bitter taste. They yield brucine and strychnine and are employed for similar purposes as *nux vomica*, but are stronger.

A fluid extract is prepared with alcohol as a menstruum, dose 0.05 to 0.02 Cc. (1 to 3 minims).

ILEX. Holly.

The leaves or berries of several species of Holly. An evergreen shrub having red berries about the size of a pea. The berries are purgative and diuretic, the leaves are diaphoretic and expectorant. The plant contains caffeine and a bitter principle.

A fluid extract is prepared, dose 1 to 4 Cc. (15 to 60 minims).

Ilicin. The bitter principle obtained from the leaves, dose 1 to 3 grains.

ILEX PARAGUAYENSIS. Paraguay Tea. Maté.

The leaves of a species of *Ilex* found in Paraguay, *Ilex aquifolium*. They have a balsamic odor and a bitter disagreeable taste. The plant contains Caffeine and is diuretic and stimulating. The natives use this as a tea which sustains the system against fatigue during long journeys or excessive labor.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

ILLICIUM. Star-Anise.**Anisi Stellati Fructus. Br. (1885). Star Anise Fruit.**

"The fruit of *Illicium verum*, Hooker filius (Nat. ord. Magnolaceæ)." < U. S. Dismissed in the 8th revision.

This is obtained chiefly from China, where it grows upon a small tree in the mountainous regions. Its properties and uses are similar to anise, and it is the principal source of oil of anise. The fruit consists of a star-shaped group of capsules enclosing the seeds, which are smooth and entirely unlike the ordinary anise. It is used for the same purposes as anise, and has the same aromatic properties.

This is chiefly the source of the oil of anise of commerce.

IMPERATORIA. Masterwort Root.

The rhizome of *Imperatoria ostruthium*, Linné (Fam. Umbelliferae). The plant is a native of Europe and North America. Its odor is aromatic and the taste pungent and bitter. It somewhat resembles aconite in appearance but not in medicinal properties. It is used as an aromatic stimulant for dyspepsia, colic and flatulence.

Dose 15 to 30 grains, usually in the form of infusion.

INDIGO.

A coloring principle produced by the fermentation of certain herbaceous plants known as *Indigofera*, (Fam. Leguminosae). These plants are found chiefly in the East Indies and Florida. Indigo comes usually in cubical masses and is of a deep dull-blue color, but becomes glossy when rubbed with the finger-nail. It is sometimes used in medicine in epilepsy, hysteria, chorea and amenorrhœa.

Dose 1 to 4 gm. (15 to 60 grains).

INULA. Elecampane.

"The root of *Inula Helenium*, Linné (Nat. ord. Compositae)." < U. S. 7th revision, dismissed from the 8th.

This is an herbaceous plant having a perennial root which is the medicinal part used. It is a native of Europe, but is naturalized in the northern and central United States.

It is a tonic and mild stimulant, often prescribed in some form in expectorant preparations. Some of its principles are also used as diuretic and emmenagogue, and for dropsy. Externally it is employed in ointment for tetter and other skin diseases. The powdered root is used in doses of 20 to 30 grains, and is an ingredient of heave powders for horses.

A fluid extract is prepared with 90% alcohol, dose 1 to 3 Cc. (15 to 45 minims).

Alantol. $C_{30}H_{36}O$. An aromatic liquid prepared from the root is a powerful antiseptic and has been highly recommended in the tubercular infantile and catarrhal diarrhœas. The dose is $\frac{1}{3}$ to 1 grain. It is also used, diluted largely with olive or almond oil, as an application to the false membrane formed in diphtheria and membranous croup.

Inulin is a species of starch precipitated from an aqueous extract of the root by pouring it into alcohol. It is used by the Eclectics.

Helenin. C_6H_8O . This is a principle obtained by precipitating an alcoholic extract in water. It is a glucoside representing a portion, only, of the medicinal activity of the root.

IPECACUANHA. U. S. Ipecac.**Ipecacuanhæ Radix. Br. Ipecacuanha Root.**

"The dried root, to which may be attached a portion of the stem not exceeding 7 Cm. in length, of *Cephaelis Ipecacuanha* (Brotero), A. Richard (Fam. Rubiaceæ), known commercially as Rio, Brazilian, or Para ipecac, or the corresponding portion of *C. acuminata*, Karsten, known commercially as Carthagena ipecac; yielding, when assayed by the process given, not less than 2 percent. of ipecac alkaloids." <U. S.

The plant is a native of Brazil, but is found in other South American States. It is gathered and chiefly exported from Rio Janiero and adjacent ports.

The root is extensively used in medicine as an expectorant and emetic, a fluid extract being official in the U. S. P., a liquid extract in the Br. P., and several other preparations in which it is the important medicament being official. The powdered root is an ingredient of Dover's Powders, and is used in many forms as an ingredient of powders, pills, troches etc. The dose of the powder as an expectorant and diaphoretic is from $\frac{1}{4}$ to 2 grains, and as an emetic from 15 to 30 grains.

A fluid extract is official in the U. S. Average dose as emetic 1 Cc. (15 minims).

A liquid extract is official in the Br. P.

Emetine. This alkaloid was isolated by Pelletier in 1817, and may be prepared in a similar manner as other alkaloids from the roots and barks. It is a very powerful emetic, the dose being $\frac{1}{4}$ grain, repeated every 15 minutes until emesis occurs.

Emetin. This is a principle obtained from ipecac, having the nature of a glucoside and from it, by the action of an acid, ipecacuanhic acid may be obtained.

It does not, like emetine, represent the active principle of the root.

IRIS. Blue Flag.

"The rhizome and rootlets of *Iris versicolor*, Linné (Nat. ord. Iridaceæ)." <U. S. 7th revision. Dismissed from the 8th.

This plant is found in wet swales throughout the United States, having large beautiful flowers resembling the cultivated varieties of iris. A solid and fluid extract of the root were official in the U. S. P. but were dismissed from the 8th revision.

The root possesses emetic, diuretic and cathartic properties and is used by Eclectics as a stimulant to the secretion of bile in liver complaints.

Iridin or Irisin is an Eclectic preparation obtained by exhausting the root with alcohol and distilling off the alcohol until only the oleo-resins of iris remains; this is mixed with some drying substance and reduced to a powder which is known by the foregoing title. A mixture of equal parts of iridin, podophyllin and leptandrin is claimed to have an alterative effect equal to calomel, and may be given without danger. A formula is given in the B. P. C.

IRIS FLORENTINA. Orris Root.

The rhizome of several species of *Iris* found in northern Italy, chiefly *Iris Florentina*, Linné (Fam. Iridaceæ). Quite commonly called violet root, because of its odor, resembling violets. It belongs to the "flags" and is mostly used in tooth and face powders, and its extract or tincture in perfumes to which it imparts a violet odor. As found in the market the choicest is "finger" orris, being selected and well trimmed, other varieties not selected have the appearance of ginger root. It yields an oil, by distillation, which is used in perfumery. This oil is solid at ordinary temperatures but as found on the market is usually mixed and in liquid form. It has the odor of violet.

JABORANDI FOLIA. Br. Jaborandi Leaves.

"The dried leaflets of *Pilocarpus Jaborandi*, Holmes." >Br.

This drug is official in the U. S. P. under the name "*Pilocarpus*," which see. In the market is is most commonly known as Jaborandi, which name it

acquires from Brazil, where it is used to designate various pungent and sudorific plants. The leaves are used in the form of an infusion to produce sweating. From 60 to 90 grains of the leaves are used in a cup of boiling water, and the draught taken at one dose.

A liquid extract is official in the Br. Dose 5 to 15 minims.

JACARANDA. Caroba.

The leaflets of *Jacaranda Procera*, (Fam. Bignoniaceæ). Native of Brazil. This is a valuable alterative and diuretic, and is highly recommended in the treatment of syphilis and blood taints. A principle named **Carobin** is obtained from it.

A fluid extract is prepared, dose 1 to 4 Cc. (15 to 60 minims).

JALAPA. U. S., Br. Jalap.

"The dried tuberous root of *Exogonium Purga* (Wendworth), Benthams (Fam. Convulvaceæ); yielding, when assayed by the process given, not less than 8 percent. of total resin, but not more than 1.5 percent. of resin soluble in ether." <U. S.

"The dried tubercules of *Ipomœa Purga*, Hayne." <Br.

This tuber is official in all pharmacopœias, different varieties being recognized in different countries; that used in this country being mostly obtained from Mexico. It is a purgative, pure and simple, and has been more used in the past than almost any other medicine. An extract and resin are official in the U. S. P., but the powdered tuber is more generally used than any other form. The dose of the powder, as a purgative, is from 10 to 30 grains; of the extract, from 4 to 8 grains.

Convulvulin. $C_{32}H_{50}O_{16}$. This name is given to a glucoside principle obtained from jalap, which represents in a high degree, the activity of the tuber. It is also called **rhodeoretin**.

Jalapin. $C_{34}H_{56}O_{18}$. This is another principle obtained from jalap which differs from convulvulin in being soluble in ether, while convulvulin is not.

From both of these glucosides acids are produced, the former known as convulvulic acid and the latter as jalapic acid.

JAMBUL. Java Plum. Jambo.

The seeds of *Eugenia jambolana* (Fam. Myrtaceæ). A tree found in the East Indies, bearing a smooth succulent fruit enclosing a single seed, like the plum. They are valuable in the treatment of diabetes mellitus.

A fluid extract is prepared, dose $\frac{1}{3}$ to $\frac{2}{3}$ Cc. (5 to 10 minims).

The leaves and bark of this tree are used for dysentery.

JATROPHA MACHORHIZA.

A plant called *Jicina*, or *Jicama*. Native of northern Mexico. The root which is thick, short and tuberous, is used. Its action is purgative similar to *leptandra*, and it has a prompt action on the liver.

A fluid extract is prepared, dose 2 to 8 Cc. ($\frac{1}{2}$ to 2 fl.drachms).

JEFFERSONIA. Twin Leaf.

The root of *Jeffersonia diphylla* (Fam. Berberidaceæ), native of the U. S. This drug is alterative, diuretic and antispasmodic. Useful in dropsy, blood disorders and nervous affections; also as a gargle for sore throat and an application to ulcers and morbid sores.

A fluid extract is prepared, dose 1 to 2 Cc. ($\frac{1}{4}$ to $\frac{1}{2}$ fl.drachm).

JUGLANS. Butternut.

"The bark of the root of *Juglans cinerea*, Linné (Nat. ord. Juglandaceæ), collected in autumn." <U. S. 7th revision. Dismissed from the 8th.

The butternut tree is a native of the northern and middle United States and Canada. Its characteristics are similar to the European walnut, *Juglans regia*.

The bark of the root is employed in medicine as an evacuent, and is reputed to act on the liver. A solid extract is official in the U. S. P., and a fluid extract is considerably used in liquid laxatives and cathartics.

Butternuts contain a large percentage of fixed oil which may be obtained by expression. It is useful in medicine as an application to enlarged joints or swellings.

Juglandin. This is a so-called resinoid or principle used by the Eclectics, and is prepared in the usual manner. (See Resinoids). It seems to possess the active properties of the bark.

Juglandic Acid. This acid has been isolated as an orange-yellow crystalline substance.

Some other substances have been reported, but they have as yet no medicinal use.

JUNIPERUS. Juniper. Juniper Berries.

The ripe fruit of *Juniperis communis*, Linné (Fam. Coniferæ), commonly known as Juniper berries; found in the northern hemisphere, America and Europe. Stimulant, diuretic, carminative. Useful in catarrhal conditions of the bladder and urinary tract and for dropsies. The properties of juniper reside chiefly in a volatile oil which, like other terebinthine oils is stimulating to the mucous membrane. The bruised berries in gin, make a favorite remedy for kidney and bladder troubles. Juniper berries are an ingredient of gin.

A fluid extract of the berries is prepared, dose 2 to 5 Cc. (30 to 75 minims).

Juniperi Lignum. Juniper Wood. This in the form of ground chips is used as an ingredient in alterative and diuretic medicines. By destructive distillation of Juniper wood Oil of Cade, Juniper Tar, is produced.

Juniperus Virginiana. Red Cedar. This is a tree of the Fam. Coniferæ, found in North America. The young twigs are sometimes used for the same purposes as savin, but the chief medicinal product of the plant is the oil distilled from the small branches. See Oil of Cedar.

KAMALA.

"The glands and hairs from the capsules of *Mallotus philippinensis*, (Lamarck), Mueller Arg. (Nat. ord. Euphorbiaceæ)." <U. S. 7th revision. Dismissed in the 8th.

Rottlera tinctora, from which this substance is obtained, is a small tree growing in Abyssinia and southern Arabia, Hindustan, China and Australia. The glandular short hairs are found on the fruit which is about the size of a cherry and has three furrows thickly covered with this red powder. The fruit or berries are put into baskets and rolled about and rubbed with the hands, and the powder which comes off sifts through the bottom of the basket and is gathered upon a sheet.

This is given for tape-worm, and is best administered in the form of an emulsion with gum arabic syrup. It is insoluble in water, but a tincture or fluid extract may be prepared with alcohol. The substance itself, however, is preferable for administration, and should be combined with oleo-resin of male fern. A formula will be found among the Standard Remedies.

KALMIA. Sheep Laurel. Spoonwood.

The leaves of *Kalmia latifolia* (Fam. Ericaceæ), native of U. S., common in mountainous districts. A heart sedative, astringent, and anti-syphiletic. Useful in blood-taint, hypertrophy of the heart, jaundice and diarrhœas, also in active hemorrhages.

A fluid extract is prepared, dose $\frac{2}{3}$ to 2 Cc. (10 to 30 minims). It should be used carefully, as it is poisonous in large doses.

KINO. U. S., Br. Kino.

"The inspissated juice of *Pterocarpus Marsupium*, Roxburg (Fam. Leguminacæ)." <U. S.

"The juice obtained from incisions in the trunk of *Pterocarpus Marsupium*, Roxb., evaporated to dryness." <Br.

Kino is used in medicine chiefly as an astringent. A tincture is official in the U. S., Br., and several other pharmacopœias. It is soluble in alcohol, but only slightly soluble in cold water. It is used in diarrhœas, leucorrhœa and diabetes, or whenever a strong, non-irritant astringent is indicated. It may be used in powder or combined with aromatics, or in tincture. Its solution in hot water may be used as an astringent lotion or injection.

Average dose.—0.500 gm.=500 milligrammes ($7\frac{1}{2}$ grains).

KOLA. Kola Nuts.

The seeds of *Sturculia acuminata*, (Fam. Sterculiaceæ). An African tree bearing the kola nut which is extensively used by the natives and now largely exported to other countries. They contain caffeine, theobromine and tannic acid and act as a stimulant to sustain the physical power during prolonged fatigue or fasting. The uses of the nut are the same as coca and guarana.

The nut of *Sterculea Acuminata* has come into considerable prominence as a powerful nervous and muscular tonic. Its action is similar to guarana and cola. Caffeine and theobromine are its chief medicinal constituents. It has been employed in the cure of drunkenness and as a remedy for cardiac diseases, also in cases of obstinate diarrhœa. The alcoholic fluid extract is precipitated by aqueous menstrua. Elixirs and Wines of Kola are prepared. The dose is the powder is 10 to 30 grains.

A fluid extract is prepared, dose $\frac{2}{3}$ to 2 Cc. (10 to 30 drops).

This drug has achieved great popularity in recent years because of its implied connection with coca, in a soda-water drinks.

KRAMERIA. U. S. Rhatany.

Krameria Radix. Br. Rhatany Root.

"The dried root of *Krameria triandra*, Ruiz and Pavon (Peruvian *Krameria*), *Krameria Ixina*, Linné (*Savannilla Krameria*) or of *Krameria argentea* Martius (Para or Brazilian *Krameria*) (Fam. *Krameriaceæ*)."<U. S.

"The dried root of (1) Para Rhatany, a species of *Krameria*, attributed to *Krameria argentea*, Mart.; or of (2) Peruvian Rhatany, *Krameria triandra*, Ruiz and Pavon."<Br.

Krameria is used in medicine chiefly as an astringent in diarrhœas and relaxed conditions of the bowels or internal organs. Its medicinal constituents are, mainly, *krameria-tannic acid* and an alkaloid named *rhatanine*, $C_{10}H_{13}HO_3$.

An extract, a fluid extract and a tincture are official in the U. S. P. and its preparations are official in all pharmacopœias.

LAC — MILK.

Milk is obtained from the mammary glands of the cow, goat or mare. It is the source of many important articles employed in pharmacy and medicine. It consists of about 85 percent. of water and 15 percent. of solid constituents, the most important of which are butter-fat, casein, of which cheese is made, and milk sugar. Preparations of milk or derived from milk that are used in pharmacy are noted in Part. II.

LACCA. Lacca Resina. Shellac.

A resin which exudes from the twigs or the branches of certain trees found in the East Indies and Ceylon, caused by the puncture of the bark by the insect *Coccus lacca*. This species of *Coccus*, after impregnating, resort in great numbers to the trees and, feeding upon the sap, increase in size and become encrusted with a resin, which seems to be formed by the insects from the plant juices. The body of the insect becomes filled with a red coloring matter similar to that produced by the cochineal insect. The insects lay eggs and then die, but the young which are hatched from the eggs, eat their way through their resinous enclosure and escape.

The twigs covered with the granular brownish or reddish resin which encloses the dead insect, are broken off and are known in commerce as "stick-lac." After crushing this and removing most of the coloring matter from the resin obtained from the stick-lac, the residue is left in very small

fragments which is known as "seed-lac." This still contains some remains of insects and is thoroughly washed with water to remove the coloring matter, then placed in long linen bags, heated before a fire and the melted resin strained by twisting the bag. The melted resin is then smeared upon bamboo rods or on wooden cylinders, then heated gently before a fire, turned dexterously so that a uniform coating of the resin may be spread upon the rod. This is then allowed to cool, waving it in the air while cooling, and then peeled off the rod in the form of thin scales or flakes known in the market as "Shellac."

Dark shellac and orange shellac are the varieties found in the market, the difference being only in color. White or bleached shellac is prepared by dissolving ordinary shellac and bleaching it with chlorine or sulphurous acid, then melting it into a mass and "pulling it," the same as in making molasses candy or taffy.

The different varieties are used for making varnishes, sealing wax etc., and for sticking glass or jet to metal and other similar purposes.

Lac Dye. This is the purplish red substance obtained from the water, after washing the crushed stick-lac and seed-lac. With proper mordants it produces a beautiful red dye on fabrics.

LACTUCA. Wild Lettuce. Lettuce.

The prickly lettuce, *Lactuca virosoa*, Linné (Fam. Compositæ); native of Great Britain but cultivated in other European countries. It is chiefly grown for making Lactucarium, which is the concrete juice of the plant. Lettuce is somewhat soporific and anodyne, having properties similar to the poppy. It is but little used in medicine.

A fluid extract is prepared, dose 1 to 5 Cc. (15 to 75 minims).

LACTUCARIUM. U. S.

"The concrete milk-juice of *Lactuca virosa*, Linné (Fam. Compositæ)." < U. S.

This is obtained from the plants of several varieties of lettuce, and gathered while the plants are in flower by making incisions in the flowering stem and scraping off the thick juice that collects, massing it together and drying it to a mass of the consistence of a hard extract. It somewhat resembles opium in its effects and has been called lettuce opium. The dose is from 10 to 20 grains as an anodyne or hypnotic.

Lactucin. This principle has been isolated from lactucarium and is supposed to be the active constituent of the drug. It is a sedative hypnotic, soluble in 70 parts of water and in alcohol. The dose is from 1 to 5 grains.

LAPPA. U. S. Burdock.

The dried root of *Arctium Lappa*, Linné; and of some other species of *Arctium*, collected from plants of the first year's growth (Fam. Compositæ)." < U. S.

This is a common roadside and garden weed found throughout Europe, where it is native, and the United States, where it is naturalized. The three varieties, *Lappa major*, *Lappa tomentosa*, and *Lappa minor*, have similar properties. The root and seeds are both used, but the root only is official. It possesses valuable medicinal properties, and is an ingredient of most of the blood purifying syrups and mixtures.

This is diuretic and diaphoretic and is used as a remedy particularly for scrofula and glandular affections. A fluid extract is official in the U. S. P., but the drug is mostly used in combination with other drugs for making blood bitters or other blood syrups.

Average dose.—2 gm. (30 grains).

LARICIS CORTEX. Larch Bark.

The dried inner bark of *Larix Europæa*, DC. (Fam. Coniferæ), grown in Europe. It has an astringent taste and a balsamic odor. The variety found

in the Tyrol and in France yield the oleo-resin known as Venice turpentine.

A decoction prepared from the bark is useful in influenzas. A tincture 1:8 is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

LARIX AMERICANA. Tamarack.

The bark of *Larix Americana*, (Fam. Coniferæ); native of the U. S. It is similar to the European larch but more slender. It is alterative, tonic and diuretic. Used in liver and kidney diseases.

The tamarack is distinguished from other conifers by being deciduous—shedding its foliage for nearly half the year.

A fluid extract is prepared, dose 4 to 8 Cc. (1 to 2 fl.drachms); also Tamarac Tincture, 1:8.

Tamarack Gum. A gum-resin exuding from the Tamarack or Hackmatack tree. It is not very abundant. It may be chewed the same as spruce gum, or a tincture may be prepared and used as a pectoral.

LAUROCERASI FOLIA. Br. Cherry-Laurel Leaves.

"The fresh leaves of *Prunus Laurocerasus*, Linn." <Br.

The fresh leaves of the cultivated tree are used chiefly for making Cherry-Laurel Water by distillation. When dried they lose their peculiar odor and are worthless for medicinal use. The fresh leaves possess properties similar to hydrocyanic acid and the water distilled from them is used extensively in Europe as a vehicle for cough medicines and sedatives.

LAURUS NOBILIS. Laurel. Bay Laurel.

The leaves and the fruit of *Laurus Nobilis* (Fam. Lauraceæ); native of southern Europe. This is commonly known as the bay-tree, its aromatic leaves being used as a flavoring for cooking, but it is not the variety from which bay rum is distilled.

A fluid extract is prepared from the leaves which is used for flavoring.

Laurel Berries. Bay-berries. The berries of the bay-tree yield a fixed oil by expression and a volatile oil by distillation. See *Oleum Lauri*, Part II.

LAVENDULA. Lavender.

The flowers of *Lavendula vera*, DC. (Fam. Labiatae). A small shrub chiefly cultivated in gardens and bearing small flowers with blue-gray tubular calyx and violet-blue corolla, having a fragrant odor and a somewhat bitterish camphoraceous taste. Stimulant and carminative, but seldom used in medicine except as flavoring.

Lavender Oil. The chief virtue of lavender resides in the volatile oil which is obtained by distillation. See *Oleum Lavendulae Florum*. Part II.

LEDUM. Marsh Tea. Wild Rosemary.

The small branches and leaves of *Ledum palustre*, Linné (Fam. Ericaceæ); found in Northern countries. The odor is strongly aromatic and the taste bitter and camphorous. It is employed in the form of infusion or tea, 1 to 2 gm. (15 to 30 grains) at a dose, for diarrhœa, rheumatism and chronic skin diseases. Also applied externally to destroy parasites.

Ledum Latifolium. Labrador Tea. This is a variety found in British America, being demulcent, tonic and expectorant, and used in bronchitis, catarrhal affections etc.

A fluid extract is prepared, dose 4 to 8 Cc. (1 to 2 fl.drachms).

LEONURUS. Motherwort.

The flowering tops and leaves of *Leonurus cardiaca*, Linné (Fam. Labiatae). Northern hemisphere. This plant has an aromatic odor and bitter taste. It is stomachic, tonic, diuretic, antispasmodic and emmenagogue. Useful in liver complaints and dropsy, rheumatism, gout and amenorrhœa. A favorite domestic remedy for female disorders.

A fluid extract is prepared, dose 2 to 8 Cc. ($\frac{1}{2}$ to 2 fl.drachms).

LEPTANDRA. U. S. Leptandra. Culver's Root.

"The dried rhizome and roots of *Veronica Virginica*, Linné (Fam. Scrofularineæ)." <U. S.

This is an herbaceous, perennial plant, found east of the Mississippi river, in the United States.

The root, which is the part used, consists of rhizome and rootlets of a blackish color. It has proven of great value as a tonic to the liver and as a laxative. An extract and fluid extract are official in the U. S.

Average dose.—1 gm. (15 grains).

Leptandrin. This principle possesses the medicinal activity of the plant, and is the true leptandrin, a crystalline principle of the nature of a glucoside, and not the Eclectic leptandrin which is the precipitate obtained by pouring a concentrated alcoholic tincture of the root into cold water, which precipitates a substance mostly resinous, that has been given that name, and is known as the resinoid of leptandra. The latter is, however, chiefly used in medicine and is generally combined with podophyllum resin, in chronic constipation and inactivity of the liver, and with the addition of irisin is an alterative of marked power. The dose of the resinoid is 2 to 4 grains.

LEVISTICUM. Lovage.

The root and the fruit (seeds) of *Levisticum officinale*, Koch (Fam. Umbelliferae); native of Europe, cultivated in Germany.

This plant has a peculiar strongly aromatic odor resembling Angelica. A similar species found in this country is called Southern Angelica. It is stimulant, carminative and stomachic. The root is known as Lovage root, and the seed as Lovage seed. It is usually given in the form of decoction, either of the root or seeds, from 1 to 5 gm. (15 to 75 grains).

LIATRIS. Gay Feather.

The root of *Liatris spicata*, (Fam. Compositae); native of U. S.

A perennial plant with an erect annual stem 14 to 15 feet high, terminating in a spike of purple, compound flowers. The root is tuberous, having a bitterish balsamic taste. It is diuretic, useful in gonorrhœa, and as a gargle.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

Liatrin. A principle obtained from this plant, dose 1 to 3 grains.

LIMONES. Lemons.

The peel of lemon fruit is official in the U. S., Br., and most all pharmacopœias. Lemon juice is official in the U. S. and some other pharmacopœias. The oil of lemon is much used as a flavoring.

Limonis Cortex. U. S., Br. Lemon Peel.

"The recently separated outer rind of the ripe fruit of *Citrus Limonum*, Risso (Fam. Rutaceæ)." <U. S.

"The outer part of the pericarp of the fruit of *Citrus medica*, Linn." <Br.

This is used for making Spiritus Limonis, which is employed for flavoring several medicinal substances; also soda water syrups and other preparations. The dried peel is sometimes used, and the fresh peel is put into hot syrup and the sugar allowed to crystallize on it. This is used as a confection.

Limonis Succus. U. S. Lemon Juice.

"The freshly expressed juice of the ripe fruit of *Citrus Limonum*, Pisso (Fam. Rutaceæ)." <U. S.

The juice should be freshly pressed out when wanted for use. Its chief constituent is citric acid.

LINDERA. Wild Allspice. Feverbush.

This is the plant *Benzoin odoriferum*, Nees (Fam. Lauraceæ).

The bark is commonly known as spice-bush bark, and the berries as spice-bush berries. It is native of North America. Its properties are aromatic, stimulant and tonic. Usually administered, either the bark or the berries,

in the form of a hot infusion which may be freely taken for incipient fevers or as a menstrual stimulant.

LINUM. U. S., Br. Linseed. Flaxseed.

"The ripe seed of *Linum usitatissimum*, Linné (Fam. Linaceæ)." <U. S.

"The dried ripe seeds of *Linum usitatissimum*, Linn." <Br.

A tisane, or mucilaginous drink is made by pouring hot water upon a small quantity of the seeds, and allowing to cool. This is a mild demulcent, useful in gastric irritability.

Linum Contusum. Br. Crushed Linseed.—"Linseed reduced to a coarse powder." <Br.

This was formerly Lini Farina, Linseed Meal, but the title was changed in the 1898 Br. P.

The ground or crushed flaxseed is commonly used as a poultice. It is wet with warm water and beaten to a soft mass which may be applied either warm or cold.

LIPPIA MEXICANA.

The leaves of this plant have been introduced as a demulcent and expectorant for bronchitis and catarrhal affections of the respiratory tract. A concentrated tincture is prepared from the fresh plant by macerating 1 part, by weight, of the flowers and leaves in 9 parts, by weight, of alcohol; or, with alcohol 7 parts and water 3 parts, if the dry drug is used. Of the tincture thus prepared $\frac{1}{2}$ to 1 fl.drachm may be given.

LIQUIDAMBAR. Sweet Gum.

A balsam obtained from *Liquidambar styraciflua*, Linné (Fam. Hamamelaceæ). North and Central America. This gum exudes from the trunk of the tree as a thick, yellow liquid, which becomes hard upon standing. Its taste and odor are balsamic, and have similar action to storax or benzoin. Useful for chronic diseases of the air passages and genito-urinary organs.

A fluid extract may be prepared from the bark of the tree, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

LIRIODENDRON. Tulip-tree.

The bark of *Liriodendron tulipifera*, Linné (Fam. Magnoliaceæ); native of the U. S. The bark of the younger branches are used in medicine. Chiefly astringent, pungent and bitter; older branches are less pungent. Useful for dyspepsia, malarial fevers and rheumatism.

A fluid extract is prepared with alcohol as a menstruum, dose 4 to 8 Cc. (1 to 2 fl.drachms).

Liriodendrin. A white, crystalline, pungent, neutral principle, soluble in alcohol. Dose 5 to 10 grains.

LOBELIA. U. S., Br. Lobelia. Indian Tobacco.

"The dried leaves and tops of *Lobelia inflata*, Linné (Fam. Campanulaceæ), collected after a portion of the capsules have become inflated." <U. S.

"The dried flowering herb of *Lobelia inflata*, Linn." <Br.

This plant is a native of the United States, growing in waste fields and along the roadside. In medicine it has proven a prompt emetic, and in small doses is used as an expectorant and in spasmodic asthma. A fluid extract and tincture are official in the U. S., but the drug is little used except by Thompsonian physicians, and for heaves of horses. The herb and seeds are both used in medicine. The dose of the powdered herb or seed is from 3 to $7\frac{1}{2}$ grains, and of the tincture 10 to 20 minims. The herb is sometimes used for smoking in asthma, and in asthma remedies.

A fluid extract is official in the U. S. Average dose 0.5 Cc. (8 minims).

Lobelin. The concentrated resinoid by this name is prepared in the same manner as others of its kind, (see Resinoids), and has met with some favor with Eclectic practitioners.

Lobeline. This is a liquid alkaloidal body obtained from lobelia which has been somewhat used for bronchial affections and asthma; the dose being from $\frac{3}{4}$ to 2 grains, but is should be cautiously administered.

LUPULINUM. U. S., Br. Lupulin.

"The glandular trichomes separated from the strobiles of *Humulus Lupulus*, Linné (Fam. Moraceæ)." <U. S.

"Glands obtained from the strobiles of *Humulus Lupulus*, Linn." <Br.

This glandular, brownish-yellow powder, consists chiefly of resinous matter which is secreted by the plant. It has a strong odor of hops, and when ignited yields not more than 10 to 12 percent. of ash. At least 60. percent. is soluble in ether. It is also soluble to a considerable extent in alcohol. A fluid extract and oleo-resin are official in the U. S. P. It has the same properties as hops, but in a greater degree. This should not be mistaken for Lupulin, the resinoid which is extracted from hops, although they are similar in their action.

Average dose.—0.500 gm.=500 milligrammes (7½ grains).

LYCOPODIUM. U. S. Lycopodium.

"The spores of *Lycopodium clavatum*, Linné; or other species of *Lycopodium* (Fam. Lycopodiaceæ)." <U. S.

The trailing plant which is commonly known as club-moss is a native of Europe and America, and the substance called Lycopodium is obtained as a lemon-colored powder by beating the moss and collecting the spores which are detached.

This is considerably used as a dusting powder, in making pills and suppositories, and also for making a flash light in theaters and for photographing, and in pyrotechnics.

LYCOPUS. Bugle Weed.

The herb, *Lycopus Virginicus*, Linné (Fam. Labiataë); gathered when flowering. Found in Canada and northern U. S. Odor somewhat like mint, taste aromatic and pungent. It is astringent and sedative, useful in hemorrhages from the lungs, and to allay coughs and fevers.

A fluid extract is prepared, dose 4 to 8 Cc. (1 to 2 fl.drachms).

Lycopin. A principle obtained from *Lycopus*, dose 1 to 5 grains.

Lycopus Europæus. Bitter Bugle Weed. This is another variety commonly known as Water Horehound. Its action is tonic and alterative. Useful in malaria.

A fluid extract is prepared, dose 2 to 4 Cc. (½ to 1 fl.drachm).

LYTHRUM SALICARIA. Loosestrife.

The entire plant. Native of Europe. It is astringent and demulcent. Useful in chronic dysentery and diarrhœa. Preferably given in the form of decoction.

Dose of plant 4 gm. (1 drachm).

MACIS. Mace.

"The arillode of the fruit of *Myristica fragrans*, Houttuyn (Nat. ord. Myristicaceæ)." <U. S. 7th. revision. Dismissed in the 8th.

Mace is the outer covering which encloses the nutmeg, and consists of narrow thick bands, branching and lobed above and uniting into broader bands below.

Its properties are similar to nutmeg, and it yields a volatile oil by distillation and a fixed oil by pressure. It is used for similar purposes as nutmeg, chiefly as an aromatic flavoring in powder, or in pieces in pickles. The fixed oil is used in several aromatic ointments and balsams, and the volatile oil in flavors.

MAGNOLIA. Magnolia.

The young bark of *Magnolia glauca*, and other varieties (Fam. Magnoliaceæ); found in the U. S. *Magnolia glauca* is a tree about 40 feet high, native of the southern States. This is also known as Sweet Bay or Swamp Sassafraz. *Magnolia acuminata*, the Cucumber tree, is found chiefly in the northern and central States. *Magnolia tripetala*, the Umbrella tree, has very large leaves and flowers, but grows to a lesser height than the other varieties. The bark of the root of these trees is astringent, pungent and aromatic. It

is tonic and stimulant, useful for chronic rheumatism and fevers.

A fluid extract is prepared from the bark, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm); also from the flowers, dose 4 to 8 Cc. (1 to 2 fl.drachms).

Magnolin. A crystalline principle having acrid, irritant taste, soluble in alcohol, but insoluble in water. Dose 1 to 5 grains.

MAIDIS STIGMATA. Corn Silk.

The thread-like Stigmas of the nearly ripe fruit of Indian Corn. It is diuretic and is used in affections of the kidneys and bladder, pyelitis, cystitis etc.

A fluid extract is prepared with dilute alcohol, dose from 2 to 10 Cc. ($\frac{2}{3}$ to 2 $\frac{1}{2}$ fl.drachms).

MAJORANA. Sweet Marjoram.

The cultivated herb *Origanum Majorana*, Linné (Fam. Labiatae).

This plant is stimulant, carminative and emmenagogue. It is usually given in the form of infusion, from 5 to 10 gm. (1 to 2 $\frac{1}{2}$ drachms) of the plant being used.

MALTUM. U. S. Malt.

"The grain of barley, *Hordeum distichon*, Linné (Fam. Gramineae), partially germinated artificially and dried." <U. S.

Grain, such as barley, oats, rye, maize etc., in which a portion of the starch has become converted into sugar by malting, is called malt. Barley and rye are the cereals usually employed for making malt, but other grains, especially corn, are now extensively malted. The process of malting, in brief, consists in macerating the grain with just sufficient water to cover it, for 24 to 48 hours, during which time the water is mostly absorbed. The superfluous water is then drained off and the grain deposited in heaps on the floor, where it is allowed to stand for 24 to 26 hours, during which time partial germination takes place, with a rise of temperature of about 10°F. It is then spread quickly on the floor and quickly turned with wooden shovels or by special machinery for some time. When the grain has germinated sufficiently (which requires experience to determine) it is thrown into a kiln and kiln-dried until the water has evaporated, and it is gradually heated to about 150°F. As thus prepared it constitutes the malt used by brewers. The changes that occur in barley are shown by the following table. They are similar in other grains:

	Comp. of Barley	Comp. of Malt
Hordeine,	55	12
Starch,	32	56
Sugar,	5	15
Gluten,	3	1
Gum,	4	15
Resin,	1	1
	100	100

The chief changes that occur, therefore, are the transformation of the hordeine (a form of starch peculiar to barley) into starch, sugar and gum.

Malted grains are extensively used in the production of ale, beer, porter, and other like beverages; also in making some kinds of spiritous liquors, as malt whisky, and gin; and in the production of vinegar. Also in making malt extracts and some proprietary preparations which have become quite prominent in the past few years. See Maltum, Part II.

MANACA. Mercurio-Vegetal.

The stem and a portion of the root of *Franciscea uniflora*, a Brazilian plant of the Scrofulariaceae order, has been used successfully in the treatment of syphilis, scrofula and rheumatism. A fluid extract is prepared from the drug with diluted alcohol. The dose is 10 to 60 minims. An elixir is prepared, also, for which the formula will be found among the Elixirs.

Manacine. An alkaloid to which this name has been given has been obtained from this plant. It has properties similar to gelsemine.

MALVA. Mallow.

The common mallow, *Malva rotundifolia*, is frequently used in medicine as a demulcent and for making poultices. Malva flowers, black; and malva flowers, blue, are found in the market and are used in species.

MANGOSTANA. Mangosteen.

The rind of the fruit of *Garcinia Mangostana*, Linné (Fam. Guttiferæ).

This fruit is obtained from India. It is about the size and shape of a small orange, but when dried is wrinkled and contracted. It is commonly known as the Mango. It is a powerful astringent, useful in diarrhoeas, dysentery etc.

A fluid extract is prepared from the pericarp, dose 1 to 4 Cc. (15 to 60 minims).

MANNA. U. S. Manna.

"The concrete saccharine exudation of *Fraxinus Ornus*, Linné (Fam. Oleaceæ)." <U. S.

Manna is a species of sugar which is obtained in Sicily, Calabria and Apulia, as a natural exudate from incisions made in the bark or sprouts or trunk of two species of ash. Several varieties of manna are found in the market and it is sorted according to quality as flakes, sorts etc. It is used as a mild laxative and a sweetening addition to laxative and cathartic compounds.

Average dose.—16 gm. (240 grains).

Mannite. (Mannitol). This is a white, inodorous, crystallizable substance obtained from manna and classed with the hexatomic alcohols. It is not used in medicine.

MANZANITA.

The leaves of *Arctostaphylos glauca* (Fam. Ericaceæ). A shrub or small tree, native of California. Its properties are similar to uva-ursi; astringent and tonic. Useful especially in urinary and bladder troubles, and diabetes insipidus. The plant contains arbutin and tannin.

A fluid extract is prepared, dose 1 to 4 Cc. (15 to 60 minims).

MASTICHE. U. S. Mastic. Gum Mastic.

"A concrete resinous exudation from *Pistacia Lentiscus*, Linné (Fam. Anacardiaceæ)." <U. S.

This resinous exudation which is commonly known as "gum-mastic," is chiefly obtained from islands in the Grecian Archipelago where the tree is cultivated for this gum. Incisions being made in the bark and branches, the juice exudes and hardens into tears or falls to the ground, where it concretes into irregular masses.

It is used in solution for mucous catarrh, and, compounded with sandarach or benzoin, moistened with chloroform, is used for filling decayed teeth to cure toothache. With oil of turpentine it makes a transparent varnish for pictures and maps, and is used by book-makers as a varnish for leather. It is also employed as a dusting for gilding on leather or cloth, and is used as an ingredient in cements for broken china etc.

Average dose in medicine, 2 gm. (30 grains).

It is chiefly used for making varnish, especially microscopic.

It is almost completely soluble in alcohol. In medicine it is used as a tonic for the stomach, and its alcoholic solution is sometimes applied as a styptic.

MARRUBIUM. U. S. Hoarhound.

"The dried leaves and flowering tops of *Marrubium vulgare*, Linné (Fam. Labiatae)." <U. S.

This herb, which is commonly known as hoarhound, is a native of Europe, but is common throughout northern and central North America.

It is a bitter tonic, used chiefly for catarrh and pectoral troubles, and in cough medicines; also as an ingredient in hoarhound candy and cough drops.

A fluid extract is prepared from the plant. The dose is $\frac{1}{2}$ to 1 fl.drachm.

MATICO. U. S. Matico.

"The leaves of *Piper angustifolium*, Ruiz et Pavon (Fam. Piperaceæ)." <U. S.

The shrub from which these leaves are obtained is native of Peru, but is found in other South American countries. It is a spicy aromatic, tonic and stimulant, and is used chiefly in the treatment of bladder and urinary troubles. A volatile oil is obtained from it by distillation and a crystallizable acid called Arthanic acid.

A fluid extract and tincture are official in the U. S. P.

Average dose.—4 gm. (60 grains).

MATRICARIA. U. S. German Chamomile.

"The dried flower-heads of *Matricaria Chamomilla*, Linné (Fam. Compos. itæ)." <U. S.

Two kinds of "Chamomile" are used in this country, the Roman and the German: the former being more generally sold to Americans and the latter to foreigners, because they are more accustomed to it in European countries.

Average dose.—16 gm. (240 grains).

A fluid extract is prepared with $\frac{2}{3}$ alcohol, dose 0.5 to 2 Cc. (8 to 30 minims).

The flowers are generally steeped to make chamomile tea which is taken as a diaphoretic and for colds, stomach troubles etc. It is also a tonic, and is given to children for worms.

MEL. U. S. Honey.

"A saccharine secretion deposited in the honey-comb by the bee, *Apis mellifera*, Linné." <U. S.

In pharmacy strained or drawn honey only is employed as a basis of honey preparations or dispensed in medicine.

MELILOTUS. Melilot. Sweet Clover.

The flowering branches of the sweet clover are sometimes used in species or mixtures of aromatic drugs. It has no marked medicinal properties but is mildly stimulant and carminative.

MELISSA. Balm.

"The leaves and tops of *Melissa officinalis*, Linné (Nat. ord. Labiatæ)." <U. S. 7th revision. Dismissed in the 8th.

Lemon Balm is a well-known herb of southern Europe, and is naturalized in this country. It has a lemon-like odor when fresh, and is used chiefly for its aromatic properties in infusions and mixtures of fresh herbs.

Average dose.—16 gm. (240 grains).

A fluid extract is prepared with diluted alcohol, dose 5 to 10 Cc. (1 to 2½ fl.drachms).

MENISPERMUM. Yellow Parilla.**Canadian Moonseed.**

"The rhizomes and roots of *Menispermum Canadense*, Linné (Nat. ord. Menispermaceæ)." <U. S. 7th revision. Dismissed in the 8th.

This is a woody climbing plant, growing in the eastern United States, and is commonly used by some practitioners as a substitute for sarsaparilla. It is no doubt of value in scrofulous affections, but has not yet been generally introduced. A fluid extract was official in the U. S. P. Dose 4 Cc. (1 fl.drachm).

Menispermin. An Eclectic concentrate prepared from menispermum and representing its medicinal virtue. Dose 2 to 5 grains.

MENTHA PIPERITA. U. S. Peppermint.

"The dried leaves and flowering tops of *Mentha piperita*, Linné (Fam. Labiatæ)." <U. S.

This was originally a native of Great Britain but has been domesticated in nearly all temperate countries. It is largely cultivated in some parts of the

United States for the production of oil of peppermint, which is generally obtained by steam distillation.

From this oil menthol is obtained, and the spirit or essence of peppermint and peppermint water are much used in medicine. In other countries similar varieties of peppermint are found which yield similar products, *Mentha Arvensis*, which is the source of Japanese menthol being the most prominent.

Average dose.—4 gm. (60 grains).

MENTHA VIRIDIS. U. S. Spearmint.

"The dried leaves and flowering tops of *Mentha spicata*, Linné (*Mentha viridis*, Linné) (Fam. Labiatae)." <U. S.

This species of *Mentha* is also a native of Europe, but is found abundantly in the northern and central U. S. The oil distilled from this plant is quite different from peppermint, but is somewhat used in medicine for similar purposes.

The use of Oil of Spearmint for flavoring chewing gum has greatly increased the consumption and the price of this oil.

Average dose.—4 gm. (60 grains).

MENYANTHES. Buckbean. Bogbean.

The leaves of *Menyanthes trifoliata*, Linné (Fam. Gentianaceæ); native of Europe and North America. It is a pure bitter tonic, given in scrofula and fevers, also as an emmenagogue and vermifuge. In large doses it is purgative and emetic.

A fluid extract is prepared, dose 1 to 4 Cc. (15 to 60 minims).

MERCURIALIS ANNUA. Mercury Weed.

This plant has been used in most all countries for ages as a purgative and emmenagogue. It is also a useful diuretic and is reputed to cure syphilis. It may be given in the form of infusion, 1 ounce in a pint of hot water.

A fluid extract is prepared, dose 1 to 2 Cc. (15 to 30 minims).

METHYSTICUM. Kava Kava. Ava Kava.

The root of *Piper Methysticum* (Fam. Piperaceæ); also known as *Ava Kava*. A shrub about 6 feet high having an astringent root with a bitter taste. It is native of Polynesia, and in the Sandwich Islands a drink is made from the fresh, large, fibrous, spongy root. The plant is stimulant and tonic in small doses, also diuretic and sialagogue. Useful in the treatment of gonorrhœa, either internally or by injection, and in rheumatism, taken internally.

A fluid extract is prepared, dose 1 to 4 Cc. ($\frac{1}{4}$ to 1 fl.drachm).

MEZEREUM. U. S. Mezezeum.

Mezerei Cortex. Br. Mezezeon Bark.

"The dried bark of *Daphne Mezereum*, Linné; and of other European species of *Daphne*, (Fam. Thymelæaceæ)." <U. S.

"The dried bark of *Daphne Mezereum*, Linn.; or of *Daphne Laureola*, Linn.; or of *Daphne Guidium*, Linn." <Br.

The shrub from which this bark is obtained is native of Great Britain, and is cultivated as an ornamental plant throughout Europe.

It has an acrid principle, soluble in water, and is used as an astringent in decoction and fluid extract of sarsaparilla compound. A fluid extract is also prepared from it. It has been used in the preparation of an irritating ointment and plaster. Some principles are obtained from it, but they have not been used to any extent in medicine. The drug is particularly recommended in combination with blood purifying remedies, for obstinate eruptions of the skin and chronic eczema. The dose of the fluid extract is 10 to 15 minims.

Average dose of the powdered bark.—0.500 gm. ($7\frac{1}{2}$ grains).

Mezezin. A concentrate representing the medicinal constituents of mezezeum. Dose $\frac{1}{2}$ to 2 grains.

MICROMERIA. Yerba Buena.

The entire plant, *Micromeria Douglassii*, Benth. (Fam. Labiatae); native of California. Odor and taste aromatic, somewhat pungent. It is employed as an aromatic stimulant and anthelmintic, especially for the expulsion of round worms.

A fluid extract is prepared with alcohol, dose 2 to 8 Cc. ($\frac{1}{2}$ to 2 fl.drachms).

MIKANIA. Guaco Leaves.

The leaves of *Mikania Guaco*, Willd. (Fam. Compositae); native of South America and West Indies. The properties of this drug are similar to those of boneset. It is used by the natives as an antidote for poisonous snake bites, and has been recommended for hydrophobia.

A fluid extract is made with diluted alcohol, dose 2 to 5 Cc. (30 to 75 minims).

MITCHELLA. Squaw Vine. Partridgeberry.

The entire plant, *Mitchella repens*, Linné (Fam. Rubiaceae). An evergreen creeping plant, native of North America. Useful in female complaints, dropsy, retention of urine and derangements of the uterine and urinary organs. It is an ingredient in "mother's cordial" and other compound female remedies.

A fluid extract is prepared with diluted alcohol, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

MONARDA. Horsemint.

The leaves and tops of *Monarda punctata* (Fam. Labiatae); native of northern U. S. This has properties similar to other species of mint, and is used as a diuretic, diaphoretic and carminative. Its chief virtue is in its volatile oil.

MONESIA. Monesia.

The bark of *Chrysophyllum glycyphalæum*, (Fam. Sapotaceae); native of Brazil. The bark is astringent, stimulant and tonic; used in dyspepsia, diarrhoea etc.

Monesia Extractum. An extract presumably prepared from this bark by boiling it with water and evaporating the decoction to dryness. This extract is imported from Brazil, and analysis shows that it contains over fifty percent. of tannin, with an acrid principle called monesin, resembling saponin, a sweet principle like glycyrrhizin and other less important substances. The dose of this extract is from 5 to 20 grains. It is similar to kino in appearance and action.

MORUS. Mulberry.

The mulberry tree, *Morus nigra*, (Fam. Urticaceae). Native of the Levant, cultivated in all temperate countries. It has a berry-like fruit much like the blackberry. The juice of this fruit is used as an acid drink in fevers and inflammation. The leaves of this tree furnish food for silk-worms.

MOSCHUS. U. S., Br. Musk.

"The dried secretion from the preputial follicles of *Moschus moschiferus*, Linné (Class Mammalia, order Ruminantia)." <U. S., Br.

The animal from which this substance is obtained is known as the musk deer, and is found in the mountainous sections of Asia. Musk is a very expensive article and is now seldom used as medicine, but is extensively employed in making perfumes. It is stimulating and antispasmodic, and is reputed to possess nerve-tonic properties which make it of much value in the culminating crisis of fevers, pneumonia and similar diseases. The dose is 10 grains. Tincture of Musk is official in the U. S.

MUIRAPUAMA.

The root of a Brazilian plant, highly recommended as a nerve stimulant. It is also an aphrodisiac reputed to be better than damiana.

A fluid extract is prepared, dose 1 to 4 Cc. (15 to 60 minims).

MUCUNA. Cowhage.

The hairs of the pods of *Mucuna pruriens*, (Fam. Leguminosæ). Native of East and West Indies. These hairs are irritating, causing intense itching to the skin. The drug was formerly used to remove intestinal worms and pin worms by injection, but it is now seldom used because of its persistent irritating action. A teaspoonful is the usual dose.

MUTISIA VICIÆFOLIA.

A climbing shrub, native of Chili, Peru and Bolivia, where it is used as a heart tonic against weakness brought on by exertion in high altitudes. It is sedative and antiperiodic. Useful in hysteria, spasmodic coughs and asthma.

A fluid extract is prepared, dose 1 to 4 Cc. (15 to 60 minims).

MYRRHA. U. S., Br. Myrrh. Gum Myrrh.

"A gum-resin obtained from *Commiphora Myrrha*, (Nees) Engler (Fam. Burseraceæ)." <U. S.

"A gum-resin obtained from the stem of *Balsamodendron Myrrha*, Nees; and probably other species." <Br.

This is obtained from Turkey and Arabia and occurs in the market in roundish tears or irregular fragments or masses. It contains about 30 percent. of resin, about 3 percent. of a volatile oil, and a bitter principle.

It is used medicinally in a considerable number of preparations and from it several substances have been obtained, as Myrrhol, Myrrhic Acid etc. It is used particularly in dentistry as an application to spongy gums in the form of tincture mixed with rose water; also for sore mouth of infants, with a swab; and as an application to ulcers, sores etc. The preparation of myrrh most used internally is *Mistura Ferri composita*, which is known as Griffith's Mixture.

Average dose.—0.500 gm.=500 milligrammes (7½ grains).

MYRCIA. Bay. Bay Leaves.

The leaves of *Myrcia acris*, DC. (Fam. Myrtacæ). Native of the West India Islands. Imported Bay Rum is produced by distilling the leaves of this tree with the native rum of Jamaica or other West India Islands. Oil of Myrcia, (Oil of Bay), is obtained from the leaves of this tree by distillation.

Bay rum is used as a fragrant application to the face and skin. Oil of Bay is used in making domestic Bay rum.

MYRICA. Bayberry. Wax-Myrtle.

The bark of *Myrica cerifera*, Linné (Fam. Myricaceæ); native of eastern North America. It is stimulant and astringent, and when powdered has an aromatic, pungent taste. Its medicinal constituents are a volatile oil and an acrid resin. It is employed in relaxed conditions of the mucous membrane, and may be used as a wash, gargle or injection in various affections of this nature.

The powdered bark is used as an ingredient of composition powder which was formerly a favorite remedy for colds, fever and influenzas, producing, when taken in hot infusion, profuse diaphoresis.

A fluid extract is prepared with alcohol, dose 2 to 5 Cc. (30 to 75 minims).

Myrtle-wax. The fruit of *Myrica cerifera* is coated with a wax-like substance, which may be obtained by boiling it in water and collecting the wax from the surface, when cold. Candles were formerly made from this wax, hence one of its common names, "Candle-berry."

Myricin. A concentrate prepared by precipitating an alcoholic extract in cold water. Dose 2 to 5 grains.

Myrtol. An oil distilled from the leaves of *Myrtus communis*, a European variety of myrtle. This oil is highly recommended as an antiseptic and sedative, having properties similar to cajuput and eucalyptus.

MYRICA. Sweet Gale. Dutch Myrtle.

The bark of the plant, (Order Myricaceæ). Native of North America. This is a small shrub having a balsamic odor and an aromatic, astringent, bitter

taste. It is stimulant and astringent. Useful for scrofula, jaundice, diarrhœas and debility of the digestive tract. The plant yields by distillation a thick volatile oil.

A fluid extract is prepared, dose 1 to 2 Cc. (15 to 30 minims).

MYRISTICA. U. S., Br. Nutmeg.

"The kernel of the ripe seed of *Myristica fragrans*, Houttuyn (Fam. Myristicaceæ), deprived of its testa." <U. S.

"The dried seed of *Myristica fragrans*, Houtt.; divested of its testa." <Br.

This familiar seed is obtained from a medium sized tree growing, principally, in the East Indies; and is used mainly as a flavoring for pastry; but is also employed in medicine in aromatic powders and species. A volatile oil is obtained from it by distillation and a fixed oil by expression. These are used for various purposes in medicinal preparations.

Average dose.—0.500 gm.=500 milligrammes (7½ grains).

NICOTINA. Tobacco.

The leaves of *Nicotina Tabaccum*, Linné (Fam. Solanaceæ). This plant, a native of America, is now grown throughout the temperate countries of the world. It is made up into many forms and is in more general use than any other drug, (if it may be called a drug). In medicine a poultice of tobacco is frequently applied to a cut, sore, swelling or ulcer. An ointment of tobacco is useful for many purposes. "The weed" is smoked as a remedy for many ailments and as a calmate for nervous disorders. A chew of tobacco is often applied to an aching tooth, and, altogether, it is much used as a remedy, besides its general use as a fumatory, masticatory and sternutatory (snuff).

Nicotina. Nicotine. A liquid alkaloid obtained from tobacco. A very powerful poison, having a strong tobacco odor and a persistent, burning taste. It is not employed medicinally.

NUPHAR ADVENA. Yellow Pond-Lily.

The rhizome of *Nuphar Advena*, (Fam. Nymphæaceæ). It is native of North America, always growing underneath the water. Astringent and bitterish, demulcent and anodyne. Useful in scrofula, bronchial affections, leucorrhœa, diarrhœa etc.

A fluid extract is prepared, dose 1 to 2 Cc. (15 to 30 drops).

A fluid extract may be mixed with water as a gargle for the throat or as an application for ulcers.

NUX—NUTS.

In official pharmacy the term "Nux" is applied to only one drug—*Nux vomica*, but commercially several kinds of nuts used in medicine are known, as areca, cashew, kola, pistaches and South American sassafras nuts. Nuts are seeds of plants; they are noticed under the pharmaceutical title of the plant which produces them.

NUX VOMICA. U. S., Br. Nux Vomica.

"The dried ripe seeds of *Strychnos Nux Vomica*, Linné (Fam. Loganiaceæ); yielding, when assayed by the process given, not less than 1.25 percent. of strychnine." <U. S.

"The dried ripe seeds of *Strychnos Nux-vomica*, Linn." <Br.

This seed, which looks very much like a button, is commonly called "dog button" or "Quaker button." The fruit from which it is obtained is a round berry, about the size of a small orange, having a smooth, orange-colored, hard rind, and containing many of the seeds in its juicy pulp. The tree upon which the fruit grows is native of the East Indies, its wood and root being employed there in the treatment of intermittent fevers. The seeds only are official. From them several valuable properties are obtained.

A fluid extract of *nux vomica* is official in the U. S. P. Average dose 0.05 Cc. (1 minim).

A liquid extract of nux vomica is official in the Br. P., dose 1 to 3 minims.
Strychnine. $C_{21}H_{22}N_2O_2$. This was made by Pelletier and Caventon in 1818, and is extensively used in medicine as a nerve tonic etc. It is more fully described under the heading Strychnine (which see).

Brucine. $C_{23}H_{28}N_2O_4$. This is found associated with nux vomica in the seeds of nux vomica, as well as in other plants, as St. Ignatius bean, false Angustura etc. It may be separated and crystallized by exhausting nux vomica or St. Ignatius beans with alcohol. Its properties are similar to strychnine.

Both the foregoing alkaloids form salts with acids, and they, being more soluble, are generally used instead of the alkaloids.

NYPHÆA. White Pond-Lily.

The rhizome of Nuphar Advena, (Fam. Nymphæacæ). Native of N. America. The root is light and spongy when dry. It has a bitter taste and is astringent and demulcent. It is applied locally to ulcers and sores, and in various preparations is employed as a wash or injection.

A fluid extract is prepared, dose 1 to 2 Cc. (15 to 30 minims).

ÆNANTHE PHELLANDRIUM. Water Fennel.

The fruit (seeds) of Ænanthe Phellandrium, Lamark (Fam. Umbelliferæ). Native of Europe and northern Asia. This plant is similar to fennel and has like properties. Its properties reside in an acrid resin and a volatile oil. It is given as a diaphoretic, stimulant and expectorant, and because of its action on the nervous system allays troublesome coughs, bronchitis and whooping cough.

A fluid extract is prepared, dose 2 to 5 minims.

ÆNOTHERA BIENNIS. Evening Primrose.

The root and flowering plant of Ænothera biennis, Linné (Fam. Onagraceæ). Native of North America. The plant is inodorous, but the flowers are very fragrant, the taste of the bark and root is sweetish, mildly astringent and afterwards acrid. It is employed chiefly as an alterative and nervous sedative and is useful for asthma, whooping cough and nervous conditions.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

OLEA — OILS.

Under this heading a great variety of substances ranging from liquids to solids, and obtained from the mineral, animal and vegetable kingdoms are classed in Part II. They are very properly divided pharmaceutically into Fixed Oils, which are obtained by expression from fatty bodies; Volatile Oils, which are mainly obtained by distillation; and may be arranged in several groups according to their characteristics, manner of making etc.; and the Mineral Oils, which, though not officially recognized, are considerably used in pharmacy.

OLIBANUM. Gum Olibanum or Frankincense.

A gum-resin obtained from several species of Boswellia, found chiefly in Arabia. It resembles myrrh and is burned as incense. It contains from 30 to 60 percent. of gum and about 56 percent. of resin, with a little volatile oil and insoluble gum (bassorin). It is used in making plasters and some other preparations, but chiefly as an ingredient of incense, combined with aromatic spices.

ONOSMODIUM VIRGINIANUM. False Gromwell.

The root of this plant, (Fam. Borraginacæ), is employed in medicine. It is a native of North America and is tonic and diuretic, useful for stone in the kidney or bladder.

A fluid extract is prepared, dose 1 to 2 Cc. (15 to 30 minims).

OPIUM. U. S., Br. Opium.

"The concrete, milky exudation obtained by incising the unripe capsules of *Papaver somniferum*, Linné (Fam. *Papaveraceæ*); and yielding, in its normal, moist condition, not less than 9 percent. of crystallized morphine when assayed by the process given." <U. S.

"The juice obtained by incision from the unripe capsules of *Papaver somniferum*, Linn., inspissated by spontaneous evaporation." <Br.

Opium is the concrete, milky exudation obtained in Asia Minor by incising the unripe capsules of the opium poppy, *Papaver Somniferum*. A few days after the petals have fallen incisions are made in the capsule, and in twelve to fifteen hours the milky exudation which has collected is scraped off and collected and afterwards formed into masses as it appears on the market. The present U. S. P. specifies that in its normal moist condition it should yield at least 9 percent. of morphine when assayed by the official process. The best grades of opium frequently contain as high as 20 percent. or even more of morphine, and a good average quality should yield when dried, 15 to 17 percent. In pharmacy opium is used for making many preparations, and is the source of many alkaloids and alkaloidal salts, which are extensively used. In medicine opium and its preparations are more frequently employed than any other, except, perhaps, preparations of cinchona.

Opium and its preparations are mostly sedative and anodyne, and are used to allay pain, quiet excited nervous action, induce sleep etc. The use of opium and morphine—although almost indispensable in medicine—is attended with great risk of forming the opium habit, and physicians cannot be too cautious in employing them. They are good servants, but bad masters.

Average dose.—0.100 gm.=100 milligrammes (1½ grains).

Powdered Opium, Deodorized Opium and Granulated Opium, being more in the nature of preparations, will be noticed under the title Opium in Part II.

A liquid extract of opium is official in the Br., dose 5 to 30 minims.

Pure Food and Drugs Law. Opium and its preparations are among the drugs that come under the provisions of this law. See article on this law.

OPOPONAX. Gum Opoponax.

A gum-resin obtained from the roots of *Opoponax chironium*, (Fam. *Umbelliferae*). Native of southern Europe. The root, when cut, exudes a milky juice which hardens into irregular roundish pieces from the size of a pea to a walnut. This gum consists of a volatile oil, gum and resin. It is stimulating, expectorant and diuretic, and is used in the form of tincture internally or made into a plaster for carbuncles, swellings and rheumatism.

The dose of the powdered gum is 1 to 2 gm. (15 to 30 grains).

ORIGANUM. Wild Marjoram.

The herb *Thymus vulgare*, Linné (Fam. *Labiatae*). Found in Asia, Africa, Europe and North America. A stimulant, carminative and emmenagogue. It is used as a seasoning in food and externally in fomentations, but is seldom given internally as medicine. Its virtues reside chiefly in its volatile oil, *Oleum Thymi*, which see, Part II.

ORTHOSIPHON STAMINEUS. Java Tea.

The leaves of this plant, which grows in Java, Australia and India, are used as a diuretic in chronic cystitis, gravel, and catarrhal conditions of the urinary organs.

A fluid extract is prepared, dose 1 to 2 Cc. (15 to 30 minims).

ORYZÆ SEMINA. Rice.

The fruit (seed) of *Oryza sativa*, Linné (Fam. *Graminaceæ*); cultivated in warm climates throughout the world.

As found in the market the seeds have the hulls removed and are white and clean, but natural rice has its outer hull. Rice is chiefly used as a food and is particularly useful for invalids as it is, when properly cooked, very readily digestible. Rice contains more starch and less fat than any other cereal.

Aqua Oryzæ. Rice-water. This is a nourishing, demulcent refrigerant drink for invalids, useful in fevers and inflammation of the digestive tract. It may be prepared by boiling 1 ounce of rice in a quart of water for two hours, replenishing the water lost by evaporation. The decoction is to be used cold and without straining, dose *ad. lib.*

Oryzæ Farina. Rice Flour. This is rice in the form of impalpable powder. It is used as a dusting for irritated surfaces and as an ingredient in toilet powders, massage pastes and skin foods.

Oryzæ Amylum. Rice Starch. This starch is prepared from rice in the same manner as starch is prepared from wheat and corn. Its granules are the smallest of any of the commercial starches. It is claimed to be superior to starches prepared from other grains and is extensively sold as patent laundry starch. It may be reduced to a fine powder and used for the same purposes as rice flour.

OSMORRHIZA LONGISTYLIS. Sweet Cicily.

The root of this plant, (Fam. Umbelliferæ). Native of U. S. and Canada. Its properties are aromatic, carminative and expectorant. Useful for coughs, weakness of the stomach and flatulence.

A fluid extract is prepared, dose 4 to 8 Cc. (1 to 2 fl.drachms).

OSMUNDA REGALIS. Buckhorn Brake.

The root-stalk of this plant, (Fam. Osmundiaceæ); native of Canada, is employed in medicine as a tonic, demulcent and styptic, particularly in diarrhoeas, dysentery, leucorrhœa etc., where a vigorous astringent is indicated.

A fluid extract is prepared, dose 4 to 12 Cc. (1 to 3 fl.drachms).

OSSA SEPIÆ. Cuttlefish Bone.

The white oval scales from 4 to 10 inches long by 2 to 4 inches broad, obtained from the back of *Sepia officinalis*, Linné (Fam. Cephalopoda). A marine monster called the cuttle-fish. This "bone" consists of from 80 to 85 percent. of calcium carbonate, a little salt and magnesia. It is an anti-acid but is seldom employed in medicine. It is a valuable ingredient in tooth powder as it has just enough "grit" to be serviceable for that purpose. It is also used in canary bird cages to supply the bird with lime.

OSTRYA VIRGINICA. Iron Wood.

The heart-wood or wood-core of this tree, (Fam. Betulaceæ), is used in medicine. It is native of U. S. It is tonic and antiperiodic. The heart-wood is cut into chips and ground.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

OVUM. Egg. Hen's Egg.

The fresh egg of the domestic fowl, *Gallus Bankiva*, var. *domestica*, Temmink (Fam. Gallinæ). Native of Java and Cochin-China, but now domesticated in all countries.

Testa Ovi. Egg shell. This consists chiefly of calcium carbonate, calcium phosphate and magnesium carbonate, together with gelatinous material which serves as an adhesive. It may be powdered and used as an antacid, but is of doubtful medicinal value.

Albumen Ovi. White of Egg. Consisting chiefly of proteids, used in making some pharmaceutical preparations, and dried, forming *albumin Ovi Siccum*, which is extensively used in calico printing and photography, and for many other industrial purposes.

Vitellum Ovi. Yolk of Egg. Used in making emulsions and some medicinal compounds.

The entire contents of the egg, either together or separate, are used as food.

OXYDENDRON ARBOREUM. Sorrel Tree.

This tree, which is of the Fam. Ericaceæ, grows in the middle and southern U. S. The tree is about 40 feet high and all of its parts have a sour taste. The

leaves are used in medicine as diuretic, tonic and refrigerant. Useful in dropsy.

A fluid extract is prepared, dose 2 to 8 Cc. ($\frac{1}{2}$ to 2 fl.drachms).

PÆONIA. Peony.

The tuberous root of *Pæonia officinalis*, Linné (Fam. Ranunculacææ). Native of southern Europe, cultivated in all temperate countries. This plant is cultivated in most countries in gardens and is one of the earliest of the Spring plants to bud and blossom. The tuberous root which is known as "Peony toes," is astringent, antispasmodic and emmenagogue, but is little used except as domestic medicine for which it has been employed in epilepsy, chorea etc. Dose $\frac{1}{2}$ to 2 oz. of root in form of infusion.

Pæonia Moutan. Tree Peony. This plant is native of China and Japan, but is now cultivated in temperate countries. It is a perennial shrub having foliage and blossoms similar to the above. The native flowers are purple but by cultivation they may be white, pink, red or spotted. The root-bark is used in medicine as an alterative, tonic and diuretic. It is aromatic and pungent.

A fluid extract may be prepared with $\frac{2}{3}$ alcohol, dose 2 to 4 Cc. (30 to 60 minims).

PANAX. Ginseng.

The root of *Aralia quinquefolium*, Gray (Fam. Araliacææ). Native of U. S. as far south as Georgia and Tennessee. Also southern Canada.

This root which is commonly known as Ginseng is in great demand by the Chinese, by whom it is considered a panacea. It commands a high price and has recently been largely cultivated throughout northern U. S. in specially constructed gardens, made for this purpose.

Ginseng is a mild tonic and stomachic, but is not known to possess other medicinal properties. In China, however, it has great repute as a medicinal agent and the more fantastic the form of the root the greater price it commands. Dose of the root 2 to 5 gm. (30 to 75 grains).

A fluid extract may be prepared with diluted alcohol, dose 4 to 8 Cc. (1 to 2 fl.drachms). See also *Aralia*.

PANCREATINUM. Pancreatin.

A proteid contained in the secretion of the pancreatic gland, having the power to emulsify and decompose fat or fixed fatty oils, and to convert starch into sugar. It is a yellowish powder and should have no disagreeable odor. When properly prepared 10 grains should emulsify not less than 120 grains of cod liver oil. It is given in atonic dyspepsia with a view to aid the digestion of fats, and is an ingredient of compounds and powders used as digestives. In pharmacy it is used to emulsify oils and make predigested foods and compounds, as peptones etc.

The process for making this will be found in Part II. under the same title.

Dose of powder 0.1 to 0.5 gm. (2 to 8 grains).

PAPAVERIS CAPSULÆ. Br. Poppy Capsules.

"The nearly ripe dried fruit of *Papaver Somniferum*." <Br.

The dried capsules of *Papaver somniferum*, Linné (Fam. Papaveracææ). Native of western Asia, cultivated. The nearly ripe capsules are gathered and dried in the sun. The medicinal properties of the drug are like opium, which is obtained from them, but in a very mild degree. The capsules are used in the form of decoctions or syrup, or fluid extract, which may be prepared with diluted alcohol, dose 2 to 10 Cc. ($\frac{1}{2}$ to 2½ fl.drachms).

Several other species of popaver are employed in medicine but have no particular value.

Papaveris Semina. Poppy Seed. Maw Seed. These seeds are obtained from the capsule of the poppy, but are of no medicinal value except as food for man and birds. The seed contains about 45 percent. of fixed oil, which is used for various purposes, particularly for mixing fine pigments. See *Oleum Papaveris*. Part II.

PAPAYA. Pawpaw. Mamãiro.

The milky juice of the fruit, and also the leaves of *Carica Papaya*, (Fam. *Passifloræ*). Native of South America. This plant has acquired a reputation as a digestive of albuminoid substances; and natural preparations from it have been given in medicine for that purpose, and have been applied locally to diphtheritic patches to dissolve them. The milky juice is also employed to stimulate deficient milk secretion of women, and for this purpose may be taken either internally or applied to the breasts.

Papaw Juice. Papaw Milk. This is a neutral, thick, milky fluid, obtained by scratching through the skin of the fruit. It has a bitterish astringent taste and acid reaction, sp. gr. 1.023, and separates on standing into two portions, a coagulated white portion, and a clear watery portion, the latter containing an albuminous substance called papayotin, which is the active principle of the juice.

Dried Papaw Milk. This is the inspissated juice of the unripe fruit occurring as a yellowish-white, coarse inodorous powder. It is applied to indolent sores and ulcers for the purpose of digesting or dissolving diseased flesh. It is also applied in solution with water and glycerin to diphtheritic membrane as a solvent.

Papain. This is the peculiar ferment found in papaw juice. It contains 10.6 percent. of nitrogen, and acts, like pepsin as a digestive. See Part II.

See also *Asimina Triloba*, the American Pawpaw.

PAREIRA. U. S. Pareira Brava.**Pareira Radix. Br. Pareira Root.**

"The dried root of *Chondrodendron tomentosum*, Ruiz et Pavon (Fam. *Menispermaceæ*). "<U. S.

"The dried root of *Chondrodendron tomentosum*, Ruiz et Pavon." <Br.

This was formerly called *Cissampelos Pareira*. The plant, which is a climbing shrub, is a native of South America and the West Indies. It is a tonic, diuretic and laxative, and is employed in the treatment of diseases of the liver, kidneys and bladder. The fluid extract is official in the U. S. P.

Average dose.—2 gm. (30 grains).

A liquid extract is official in the Br., dose $\frac{1}{2}$ to 2 fl.drachms.

An alkaloid called pelosine or cissampeline is obtained in the usual manner from the plant, and is reputed to represent the medicinal activity of the root.

PARTHENIUM. Fever Few.

The flowering herb, *Pyrethrum parthenium*, (Fam. *Compositæ*). Native of Europe. This plant is a species of chamomile and has similar properties and action. It is tonic, diuretic, aperient and emmenagogue. Useful in nervous debility, dyspepsia and female disorders.

A fluid extract is prepared, dose 4 to 8 Cc. (1 to 2 fl.drachms).

PENTHORUM SEDOIDES. Virginia Stone Crop.

The herb, (Fam. *Crassulacæ*). Native of U. S. and Canada. It is astringent, demulcent and laxative. Useful in diarrhoeas, catarrhal inflammation of the stomach and bowels and bronchitis.

A fluid extract is prepared, dose $\frac{2}{3}$ to 2 Cc. (10 to 30 minims).

PEPO. U. S. Pumpkin Seed.

"The seed of *Cucurbita Pepo*, Linné (Nat. ord. *Cucurbitacæ*). "<U. S.

Pumpkin seeds are used as a remedy for tape-worm, and are given in the form of infusion as a diuretic, especially for young children. For tape-worm $\frac{1}{2}$ ounce of the "meat" of the seeds in coarse powder, beaten in a mortar with a little water, is taken before breakfast, and in two hours followed with a dose of castor oil or other cathartic.

Cucurbita Citrullus. Watermelon Seeds. Native of southern Asia but cultivated in U. S. and Europe. These seeds are diuretic and demulcent and useful for kidney and bladder troubles and dropsy. An infusion of the crushed

seeds is the best way to administer them. Dose 2 to 8 gm. ($\frac{1}{2}$ to 2 drachms).

Cucumis Melo. Muskmelon Seeds. These are much smaller than water-melon seeds but have similar properties and uses.

PEPSINUM. Pepsin.

The digestive principle of the gastric juice secreted by the glands of the stomach. The substance called "Pepsin" is prepared from the stomach of the pig or hog in several ways and is found in the market in scales, granules or powder, of various degrees of strength, graduated by its digestive power. It is employed to aid the digestion of albuminoid substances which it does by changing them to peptones. Pepsin seems to act as a catalyzer when taken into the stomach giving it power to digest a much larger quantity of food than the added pepsin alone could do.

In pharmacy pepsin is an ingredient of compound pepsin powders used as digestives, and is made into several liquid forms as liquor pepsin, elixir of pepsin, wine of pepsin etc. It is also used in making predigested foods and peptone compounds. The process used for making pepsin and its compounds and preparations will be noticed in Part II.

Dose of pepsin varies as to its strength which is shown usually on the label.

PERSEA GRATISSIMA. Alligator Pear.

The seeds of this pear, known in Mexico as Aguacate, or Avocado Pear, are highly recommended as an anthelmintic and for removing tape-worm. A poultice of the powdered seed is said to be an excellent application for intercostal neuralgia.

A fluid extract of the seeds is prepared, dose 2 to 4 Cc. (30 to 60 minims).

PERSICA. Peach.

The leaves and fruit of *Persica vulgaris*, (Fam. Rosaceæ). Native of southwestern Asia, but domesticated in all temperate countries. The leaves are sedative, diuretic, antispasmodic etc. Used for irritation of the bladder, urethra and bowels.

A fluid extract is prepared, dose $\frac{2}{3}$ to 2 Cc. (10 to 30 minims).

The fruit is a favorite, fresh, preserved or dried.

The nuts yield Ol. Persico, similar to bitter almond oil.

PERSIO. Cudbear.

A purple-red powder prepared from *Lecanora tartarea* and other lichens, chiefly used for dyeing, and in pharmacy for coloring liquid preparations red. The coloring matter of the powder readily dissolves in diluted alcohol.

A tincture of cudbear is prepared for coloring preparations, 1 ounce of the powder with 10 ounces of diluted alcohol.

Cudbear is prepared from the same plants that produce Litmus, but is prepared in a different manner. See Litmus, Part II.

Orchil is a liquid coloring substance prepared by macerating the same kind of lichens as produce cudbear in an ammoniacal liquor. It is used for coloring red.

PETROSELINUM. Parsley. Petroselinum Radix. Parsley Root.

The root of *Petroselinum sativum*, Hoffman (Fam. Umbelliferæ). Native of southern Europe, cultivated in all countries. The root is fleshy and tapering, 6 to 7 inches long and $\frac{1}{2}$ to $1\frac{1}{2}$ inches thick. It is aperient, carminative and diuretic. Useful for female complaints and kidney troubles.

A fluid extract is prepared from the root, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

Apiin. A neutral principle obtained from parsley root, soluble in alcohol and water.

Petroselini Fructus. Parsley Fruit (Seed).

The dried ripe fruit of Parsley has properties similar to the root but in a greater degree.

Apiol. This is a colorless liquid of the nature of an oil, obtained from the fruits (seeds). It is insoluble in water but soluble in alcohol, ether and chlo-

reform. Its sp. gr. is 1.078; the dose is $\frac{1}{2}$ to 1 Cc., usually administered in the form of "pearls," that is, small closed capsules.

PHORADENDRON. American Mistletoe.

The whole parasitic plant *Phoradendron flavescens*, Nutall (Fam. Loranthaceæ). Native of northern U. S. This plant has a heavy, disagreeable odor and a sweet-bitter taste. It secretes a tenaceous substance called viscin, ("bird lime" or "bird glue"), consisting of a resin, fixed oil, tannin and various salts. It is astringent, narcotic, antispasmodic and oxytotic. Useful in nervous disorders, epilepsy, hysteria and uterine hemorrhage.

A fluid extract is prepared, dose 2 to 4 Cc. (30 to 60 minims).

PHYSOSTIGMA. U. S. Physostigma.

Physostigmatis Semina. Br. Calabar Bean.

"The ripe seeds of *Physostigma venenosum*, Balfour (Fam. Leguminosæ); yielding, when assayed by the process given, not less than 0.15 percent. of alkaloids soluble in ether." <U. S.

"The ripe seeds of *Physostigma venenosum*, Balfour." <Br.

The climbing plant from which this bean is obtained grows along the banks of streams in Calabar, and the beans are chiefly gathered from the water of the streams into which they fall and are carried down by the current.

Average dose.—0.100 gm.=100 milligrammes ($1\frac{1}{2}$ grains).

In Africa this is used as an "ordeal bean," the accused captive being given a large dose of the pounded beans infused in water, which proves fatal unless copious vomiting ensues, which proves to the natives that the victim is "not guilty," and he is released.

A solid extract of the bean is official in the U. S. P. The dose is $\frac{1}{30}$ to $\frac{1}{6}$ grain.

A fluid extract is prepared with alcohol, dose 0.05 to 0.2 Cc. (1 to 3 minims).

Physostigmina. Physostigmine. Eserine. $C_{15}H_{21}O_2$. The active principle of calabar bean (physostigma) is obtained by exhausting finely powdered calabar bean with alcohol by means of a water-bath percolator, distilling off most of the alcohol of the percolate, adding water to the residue and shaking with ether, which dissolves the alkaloid. The ether is allowed to evaporate and the alkaloid is obtained in crystals.

Physostigmine, which is more frequently called Eserine, is a powerful sedative poison, the dose being $\frac{1}{200}$ to $\frac{1}{60}$ grain. Two salts of this alkaloid are official, see Part II.

PHYSALIS. Ground Cherry.

The fruit of *Physalis alkekengi*, (Fam. Solonaceæ). Native of southern Europe. It is diuretic, aperient and febrifuge, particularly useful in gravel, gout and all calcarious affections. All parts of the plant yield a bitter principle named **Physalin**, $C_{14}H_{10}O_5$, which represents its activity.

PHYTOLACCA. U. S. Poke.

The berries (fruit) and root were both official in the 1890 U. S. P.

Phytolaccae Fructus. U. S. Phytolacca Fruit. Poke Berry.

"The fruit of *Phytolacca decandra*, Linné (Nat. ord. Phytolaccaceæ)." <U. S. 7th revision. Dismissed in the 8th.

Phytolaccae Radix. U. S. Phytolacca Root. Poke Root.

"The dried root of *Phytolacca decandra*, Linné (Fam. Phytolaccaceæ)." <U. S.

This herbaceous plant grows throughout the northern and middle United States in waste lands and along fences and the edge of woods. The berries are dark purple or black, and from the juice a temporary ink may be made. When dried they are used in mixtures of laxative and blood purifying medicines. The root possesses alterative properties and is used in combination with other medicines as a blood purifier and remedy for syphilis, scrofula, and blood taints. It is also highly esteemed as a remedy for rheumatism. Large doses are purgative, emetic and narcotic. A fluid extract is official in the U.

S. P. Dose, 2 to 5 minims as an alterative; 10 to 30 minims as a purgative.

Average dose of powdered drug.—0.125 gm.=125 milligrammes (2 grains).

Phytolaccin. This is a precipitated extract of the plant prepared in the same manner as other resinoids, and used by Eclectic practitioners. It is reputed to be an excellent remedy for obesity.

PICHI. Pichi Folia. Pichi Leaves.

The leaves of *Fabiana imbricata*, (Fam. Solanaceæ); a South American shrub or small tree. The leaves are diuretic, and are useful in the treatment of catarrh of the bladder, gravel, and uric acid diathesis.

A fluid extract is prepared, dose $\frac{2}{3}$ to $2\frac{1}{2}$ Cc. (10 to 75 minims).

PICHURIUM SEMINA. Pichurium Beans.

The seeds or beans of *Nectandra pichury*, Nees (Fam. Lauraceæ). Native of Brazil. This drug consists of the dried cotyledons (beans) of the plant. They have an odor and taste like nutmeg and saffron, and are used as a tonic, stimulant and astringent in bowel troubles and menstrual derangements.

Average dose of the powdered beans, 0.5 to 1.5 gm. (8 to 22 grains).

PILOCARPUS. U. S. Jaborandi.

Jaborandi Folia. Br. Jaborandi Leaves.

"The leaflets of *Pilocarpus Jaborandi*, Holmes; or of *Pilocarpus microphyllus*, Stapf (Fam. Rutaceæ), yielding, when assayed by the process given, not less than 0.5 percent. of alkaloids."<U. S.

"The dried leaflets of *Pilocarpus Jaborandi*, Holmes."<Br.

The plant from which the leaves are obtained is a species of rue growing in Brazil.

The preparations of this drug produce profuse perspiration and act upon other glands of the body as an active stimulant, increasing the salivary secretions and the elimination of urea to a marked degree. It is, therefore, the best remedy known for uremia and other conditions in which it is desirable to cause glandular organs to discharge their secretions freely. It is used in influenza, catarrh, rheumatism, Bright's disease, synovitis etc. A fluid extract is official in the U. S. P., the dose being 30 to 60 minims.

Average dose of powdered leaves.—2 gm. (30 grains).

Pilocarpina. Pilocarpine. $C_{11}H_{16}N_2O_2$. This is the chief medicinal constituent of the leaves of *Pilocarpus pennatifolius* (jaborandi). It is obtained by exhausting the drug with alcohol by the water-bath percolator, distilling off most of the alcohol from the percolate, adding water and soda or potassa alkali, collecting the precipitate, washing with chloroform, and evaporating the solution. This produces pilocarpine, an uncrystallizable alkaloid. Two salts of this alkaloid are official in the U. S. P. See Part II.

Pilocarpine is a diaphoretic and sialogogue. Dose $\frac{1}{16}$ to $\frac{1}{4}$ grain.

PIMENTA. U. S., Br. Pimento. Allspice.

"The dried, nearly ripe fruit of *Pimenta officinalis*, Lindley (Fam. Myrtaceæ)."<U. S.

"The dried, full-grown unripe fruit of *Pimenta officinalis*."<Br.

This fruit, which is commonly known as spice or allspice, is frequently added to aromatic species, and the volatile oil obtained from it by distillation is used as a flavoring ingredient in several preparations. It is a warm aromatic and stimulant, but is seldom used in medicine except in combination. In powder it is a familiar flavoring for pastry.

Average dose.—1 gm. (15 grains).

PIMPINELLA. Pimpernel.

The root of *Pimpinella saxafraga*, Linné (Fam. Umbelliferae). Native of Europe and Asia. It is aromatic, spicy and pungent, followed by an acrid

taste; stimulant, carminative and emmenagogue. Promotes the secretions generally. Useful in catarrhs, dyspepsia and flatulence.

The dose of the drug is 2 gm. (30 grains).

A fluid extract is prepared, dose 1 to 2 Cc. (15 to 30 minims).

PINUS STROBUS. White Pine.

The inner bark of White Pine, a large tree native of northern U. S., (Fam. Coniferæ). A balsamic expectorant useful in chronic affections of the air passages, catarrh and catarrhal conditions of the stomach, bowels or bladder.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

Several other varieties of pine native of North America and Europe are used for various purposes in medicine, but most of them are the source of pitch, turpentine, balsams or oils which will be noted elsewhere. The white pine is the only one from which a fluid extract is prepared, and of which the bark is commonly used in medicine.

PIPER. U. S. Pepper.

Piper Nigrum. Br. Black Pepper.

"The dried unripe fruit of *Piper nigrum*, Linné (Fam. Piperaceæ)." <U. S.

"The dried unripe fruit of *Piper nigrum*, Linn." <Br.

Black pepper is well known as a condiment, and is somewhat used in medicine. An oleo-resin is obtained from it by percolating with ether and evaporating the percolate. It is a prompt stimulant, and is used externally and internally.

Average dose.—0.500 gm.=500 milligrammes ($7\frac{1}{2}$ grains).

Piperine. Piperina. U. S. "A feebly basic substance obtained from pepper, and from other plants of the Piperaceæ." <U. S.

This is an alkaloid obtained from black pepper, soluble in alcohol. It has been employed with much success in diphtheria and as an antipyretic in fevers. Dose 1 to 10 grains in powders or pills; or much diluted with some inert powder, as a dusting for diphtheritic membrane.

Average dose.—0.200 gm.=200 milligrammes (3 grains).

PISCIDIA. Piscidiæ Radix Cortex. Jamaica Dogwood.

The bark of the root of *Piscidiæ Erythrina*, Linné (Fam. Leguminosæ). Native of the West Indies. This drug has a narcotic action, dilating the pupils of the eye like belladonna, but in a less degree. It acts upon the salivary glands, causing an abundant secretion and, like opium, is used to relieve pain and produce sleep, but has no bad after effects.

A fluid extract is prepared, dose 2 to 8 Cc. ($\frac{1}{2}$ to 2 fl.drachms).

Piscidin. This is a resinoid or resinous substance obtained from the root, the dose is 1 to 3 grains.

PLANTIGO MAJOR. Plantain.

The leaves of common plantain, (Fam. Plantaginaceæ). Native of Europe, but domesticated in U. S. Sometimes called Ribwort on account of the prominent ribs of its leaves. It is alterative, antiseptic and diuretic, but its chief use is the bruised fresh leaves for bites of insects or serpents.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

PODOPHYLLUM. U. S. May Apple.

Podophylli Rhizoma. Br. Podophyllum Root. Mandrake Root.

"The dried rhizome of *Podophyllum peltatum*, Linné (Fam. Berberidaceæ)." <U. S.

"The dried rhizome and roots of *Podophyllum peltatum*, Linn." <Br.

This herbaceous plant is common in thin woods and along fences and on low grounds in the northern and central United States. It is extensively used in medicine as a cholagogue, alterative and purgative. An extract, fluid extract and resin are official in the U. S. The dose of the fluid extract is from 5

to 15 minims; in overdoses it produces violent retching and acts as an irritant poison.

Average dose of powder.—0.500 gm.=500 milligrammes (7½ grains).

Podophyllum Resin. This is official under this title in the Br. P., but in the U. S. under the heading *Resina Podophylli*, which see. It is prepared by pouring a concentrated alcoholic tincture of the rhizome into cold water, and collecting the precipitate which occurs. This possesses the medicinal activity of the root, and is much prescribed in powders, pills and triturations. The dose is from ⅛ to ¼ grain as a laxative and ¼ to ½ grain as a purgative.

POLEMONIUM. Abscess Root.

The root of *Polemonium Reptans*, (Fam. *Polemoniaceæ*); commonly known as Abscess root. Native of middle and southern U. S. It is diaphoretic, astringent and expectorant. Useful in bronchial troubles and inflammations or any conditions requiring a resolvent treatment.

A fluid extract is prepared, dose 2 to 4 Cc. (½ to 1 fl.drachm).

POLYMNIA. Polymniæ Radix. Bearsfoot.

The root of *Polymnia Uvedalia*, Linné (Fam. *Compositæ*). Native of U. S. from Illinois to Florida. Also known as leaf-cup. It is a stimulant, laxative and alterative. Useful for glandular enlargements, tumors and swellings, especially for ague-cake and in rheumatism, in the form of an ointment.

A fluid extract is prepared, dose 0.25 to 0.50 Cc. (4 to 8 minims).

POLYGONATUM. Solomon's Seal.

The rhizome of *Polygonatum Giganteum*, Dietrich; and *P. biflorum*, Ell. (Fam. *Lilacæ*). Native of U. S. This drug commonly known as Solomon's seal, contains a bitter acrid principle identical with the principle found in *Convallaria*, called *Convallarin*. The drug is mucilaginous and slightly astringent and is chiefly used as a demulcent and in inflammatory conditions of the mucous membrane.

A fluid extract is prepared, dose 1 to 2 Cc. (15 to 30 grains).

POLYGONUM. Water-Pepper. Smartweed.

The herb, *Polygonum Acre*, (Fam. *Polygonacæ*); commonly known as Smartweed. Native of U. S., growing in moist low grounds. It is stimulant, diuretic, diaphoretic and emmenagogue. Used in the form of infusion for suppressed menses, and as a diaphoretic. Also externally in a fomentation to relieve pain and swellings.

A fluid extract is prepared with alcohol, dose 4 to 8 Cc. (1 to 2 fl.drachms).

POLYPODIUM. Polypodii Rhizoma. Polypody.

The root of *Polypodium vulgare*, Linné (Fam. *Polypodiaceæ*). Native of northern Europe. It is demulcent, laxative and anthelmintic. In the form of a strong decoction it is used for the expulsion of tape-worm. The leaves are also employed in the form of infusion as a purgative.

POLYTRICHUM. Hair Cap Moss.

The entire plant, *Polytrichum juniperinum*, (Fam. *Polytricharacæ*). Native of northern and middle U. S. It is diuretic and in the form of infusion is used for dropsies and to promote action of the kidneys.

A fluid extract is prepared, dose 4 to 8 Cc. (1 to 2 fl.drachms).

POPULUS. White Poplar.

The bark of *Populus tremuloides*, (Fam. *Salicacæ*). Native of U. S. This is a bitter tonic and antiperiodic, having properties similar to *Cinchona*.

A fluid extract is prepared, dose 2 to 4 Cc. (½ to 1 fl.drachm).

Populin. A bitter principle obtained from this bark and having properties like salicin, dose 4 to 8 grains.

Populi Gemmæ. Poplar Buds. **Populus Candicans.** Balm of Gilead. The buds of the Balm of Gilead tree. New England States. The buds contain a

resinous gum; they are stimulant, diuretic and anthelmintic. Useful in cough remedies, bladder and urinary troubles. An ointment is also prepared by steeping the buds in lard.

A fluid extract is prepared with alcohol, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

PORTULACA. Purslane.

The herb, (Fam. Portulacaceæ), common as a garden weed in U. S. It is a diuretic, refrigerant and anthelmintic, used chiefly in domestic medicine as a poultice for sores, ulcers or wounds, and internally as a remedy for scurvy, scrofula and catarrhal conditions.

A fluid extract is prepared, dose 4 to 12 Cc. (1 to 3 fl.drachms); but it is best administered in the fresh plant.

PRINOS. Prinos Cortex. Black Alder.

The bark of *Prinos verticillatus*, Linné (Fam. Aquifoliaceæ). U. S. and Canada. Commonly called Winter Berry. This bark is astringent, tonic and alterative. Used as a blood purifier and in skin diseases.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

PRUNUM. U. S., Br. Prune. Prunes.

"The partly dried fruit of *Prunus domestica*, Linné (Fam. Rosaceæ)." <U. S.
"The dried ripe fruits of *Prunus domestica*, Linn.; var. *Juliana*, DC." <Br.

The dried fruit commonly known as prunes is stewed for a table-sauce. In pharmacy it is an ingredient of Confection of Senna, and is used in some of the laxative masses and syrups which are sold as proprietary medicines. It is nutritive, but has no other medicinal value.

PRUNUS VIRGINIANA. U. S. Wild Cherry.

Pruni Virginianæ Cortex. Br. Virginian Prune Bark.

"The bark of *Prunus serotina*, Ehrhart (Fam. Rosaceæ); which should be collected in autumn and carefully dried and preserved." <U. S.

The tree from which this bark is obtained is common throughout the northern and central United States, and is known as Wild Cherry. It is used medicinally as a tonic and as a sedative in cough preparations. Its chief medicinal constituent is hydrocyanic acid. A fluid extract, infusion and syrup are official in the U. S. P.

Average dose.—2 gm. (30 grains).

Prunin. A concentrate prepared from wild cherry bark, and representing its active medicinal properties. Dose 2 to 5 grains.

PTELEA. Pteleæ Cortex. Wafer Ash Bark.

The bark of the root of *Ptelea trifoliata*, Linné (Fam. Rutaceæ). Native of North America. This is a shrub 6 to 12 feet high, commonly called shrubby trefoil, or hoptree, because of its flavor of hops. It is tonic and antiperiodic. Useful in dyspepsia and debility following fevers.

A fluid extract is prepared, dose $\frac{3}{4}$ to 2 Cc. (10 to 30 minims).

Ptelein. A principle obtained from the bark and representing its properties. Dose 1 to 5 grains.

PULMONARIA. Lungwort.

The plant, *Pulmonaris officinalis*, Linné (Fam. Boraginaceæ). Native of Europe, cultivated in U. S. It is demulcent and astringent. Useful in pulmonary catarrhs and bronchial affections.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

PULSATILLA. Pulsatilla.

"The herb of *Anemone Pulsatilla* and of *Anemone partensis*, Linné (Nat. ord. Ranunculaceæ)." <U. S.

This herb is common in the United States and in some sections of Europe. It is employed more particularly by homeopathic physicians for ovarian

neuralgia, amenorrhœa and other disturbances of the generative organs, and has proven useful in convulsive diseases and spasmodic asthma, coughs etc. The dose of the powder is 2 or 3 grains.

Anemonin. A principle by this name has been isolated from the drug, and seems to represent its medicinal activity. The dose is $\frac{1}{3}$ grain.

PYCNANTHEMUM. Wild Basil.

The leaves of *Pycnanthemum montanum*, commonly known as mountain mint. Found in middle and western U. S. The plant is aromatic, tonic, stimulant and carminative. Chiefly used in domestic medicines in the form of infusion for bowel troubles.

A fluid extract is prepared, dose 1 to 4 Cc. ($\frac{1}{4}$ to 1 fl.drachm).

PYRETHRUM. U. S. Pellitory.

Pyrethri Radix. Br. Pyrethrum Root. Pellitory Root.

"The root of *Anacyclus Pyrethrum* (Linné), *De Candolle* (Fam. *Compositæ*). "<U. S.

"The dried root of *Anacyclus Pyrethrum*. DC." <Br.

This plant is a native of the Levant, Barbary and the European coast of the Mediterranean. The root is an irritant and sialogogue, and is used in medicine as a remedy for headache, toothache and neuralgic affections, either internally or externally. An alcoholic tincture is official. The dose of the root is from 15 to 60 grains.

Average dose.—2 gm. (30 grains).

A fluid extract is prepared with alcohol, dose 1 to 4 Cc. ($\frac{1}{4}$ to 1 fl.drachm).

Pyrethrine is an active principle obtained from the drug, which, when treated with alcoholic potash, splits up like piperine, yielding pyrethric acid.

PYRETHRUM. Pyrethri Flores. Insect Flowers.

The unexpanded flower-heads of several species of *Pyrethrum*, (Fam. *Compositæ*). Grown in Dalmatia, Persia, the Caucasus and in California. They are commonly known in the market as Dalmatian or Persian Insect Powder, but the variety grown in California, *P. cinerariæfolium*, which is the same as the Dalmatian, is known as Buhack.

These insect flowers in the form of powder are used as a dust for killing flies and insects. Their value for this purpose being chiefly in the pollen which is enclosed in the unexpanded flower-heads.

The unexpanded flowers used for insect powder should not be confounded with the above mentioned drug which is the root of an entirely different plant. The pyrethrum plants producing these flowers are allied to chamomile, but are not properly of the anthemis order. *Pyrethrum carneum* and *Pyrethrum roseum* are grown at an elevation of about 5000 feet on the Caucasian mountains; but the most effective insect powder is now produced from the variety grown in California and known as Buhack. This is most effective when burned in a closed room, but equally as effective as others, when sprinkled around the room.

PYRUS MALUS. Apple Tree.

The bark and the fruit of the Apple, (Fam. *Rosacæ*). Native of Europe and U. S. The bark of the apple tree is a mild astringent tonic, sometimes used in the form of decoction.

A fluid extract is prepared, dose 1 to 4 Cc. ($\frac{1}{4}$ to 1 fl.drachm).

The fruit is used in many ways; as a table fruit, for making apple juice or cider, or boiled cider, the fermented juice, and a distillate from it like brandy, called apple brandy, and for concentrating to an extract known in pharmacy as *Ferri pomatum*; also as a food product—apple sauce or, concentrated apple butter; also for making jelly, for which it is one of the best bases known.

QUASSIA. U. S. Quassia.

Quassia Lignum. Br. Quassia Root.

"The wood of *Picræna excelsa* (Swartz), *Planchon* (Fam. *Simarubacæ*); known commercially as Jamaica Quassia, or *Quassia amara*, Linné (Fam. *Simarubacæ*). "<U. S.

"The wood of the trunk and branches of *Picræna excelsa*, Lindl." <Br.

The large tree from which this wood is obtained is found in several of the islands of the Caribbean Sea. The wood is now furnished in the form of chips or shavings or ground to a coarse powder; drinking goblets are also turned from the wood, the water standing in them for a few minutes becoming bitter, is drunk. An extract, fluid extract and tincture, all of which are intensely bitter, are official in the U. S. P. Quassia water is also used in medicine.

It is a simple bitter tonic and invigorant of the digestive organs, and although not a laxative, it relieves constipation by giving tone to the alimentary canal.

Average dose.—0.5 gm. (7½ grains).

Quassin. This principle seems to represent the activity of the wood, although several other substances are obtained from it. The dose of quassin is about ⅓ grain.

QUERCUS ALBA. U. S. White Oak.

"The dried bark of *Quercus alba*, Linné (Fam. Cupuliferæ), collected from trunks or branches ten to twenty-five years of age, and deprived of the pericardium." <U. S.

This species of oak is found throughout the middle U. S. and Europe. The bark is used for tanning leather and as an astringent in medicine, usually in the form of a decoction. It is given in diarrhoea and relaxed conditions and is also used as an astringent wash and injection.

A fluid extract of the bark is official in the U. S. P. Dose 1 Cc. (15 minims).

Quircitrin. A crystalline principle is obtained from the bark which is sometimes used in medicine, also several other similar substances which possess more or less the properties of the bark.

QUILLAJA. U. S. Soap Bark.

Quillaia Cortex. Br. Quillaia Bark. Panama Bark.

"The dried bark of *Quillaja Saponaria*, Molina (Fam. Rosaceæ); deprived of the periderm." <U. S.

"The inner part of the bark of *Quillaja Saponaria*, Molina." <Br.

The tree from which this bark is obtained is of a moderate size and is native of Chili and Peru. It is much used as a substitute for soap on fine fabrics and for producing a foam in soda water, lather in tooth washes, and other preparations. It is but little used in medicine, but tincture of quillaja is official in the U. S. P., and is used for making emulsions. A syrup may be made which has properties similar to syrup of Senega; the powdered bark is also used as an ingredient of catarrhal snuff.

A fluid extract of the bark is prepared with diluted alcohol, Dose 2 to 10 minims.

Saponin. Saponin, quillaic acid and lactosin are obtained from this bark, and represent its principles.

RADICES — ROOTS.

Racines, Fr.; Wurzeln, Ger.; Raizes, Sp.

In botany the root is the descending axis of the plant; in commerce roots are the parts of the plants that grow in the ground; but in pharmacy they are separated into classes according to their characteristics, and are designated as root, rhizome, rootlets, bulb, corm, and tuber; the root being the part of the descending axis of the plant through which it obtains certain portions of its nourishment, the bulb, corm and tuber being storage for food required for future development of the species.

In the U. S. and some of the European pharmacopœias only the name of the plant from which the root is obtained is given, as *Glycyrrhiza*, but in case the root and some other part are official, the title is followed with the word *Radix* or "root." In the Br. P. the Latin name of the plant is followed by the word "*Radix*," as *Glycyrrhiza Radix*, and the common title has the name of the plant preceding the word "root," as *Liquorice root*.

In some pharmacopœias the Latin word *Radix* precedes the name of the plant, as *Radix Glycyrrhiza*, etc.

As all of the U. S. and Br. P. Roots are described in this work in the alphabetical order of subjects, and those not official are mostly noted elsewhere, they will not be further considered under this heading.

RHAMNUS CATHARTICUS. Buckthorn.

The bark and the berries are used in medicine. (Fam. *Rhamnaceæ*). Native of Europe and America. The bark is described under the title *Frangula*, which see. The fruit *Rhamni Cathartici Fructus*, Buckthorn Berries, is considerably used in Europe as a purgative combined with other cathartics.

A fluid extract is prepared, dose 2 to 5 Cc. (30 to 75 minims).

Buckthorn Juice. This is expressed from the fresh berries. It is greenish at first but changes to purplish-black when kept. It is a very acrid cathartic. Dose 1 to 4 Cc. (15 to 60 minims).

A syrup is also prepared which is more generally used than any preparation of buckthorn berries. A formula for this will be found under *Syrups*, Part II.

RHAMNUS PURSHIANA. U. S. Cascara Sagrada.

Cascara Sagrada. Br. Sacred Bark. Chittam Bark.

"The bark of *Rhamnus Purshiana*, De Candolle (Fam. *Rhamnaceæ*); collected at least one year before being used." <U. S.

The tree from which this bark is obtained grows to about the height of 20 feet, and is found in California and northward to the British possessions. It should not be used as medicine until after it has been gathered at least one year. It has become very popular as a laxative and tonic to the intestinal canal and is much used in different forms and preparations. A fluid extract is official in the U. S. and a liquid extract in the Br. P., besides many manufacturers make so-called tasteless preparations by using an alkaline menstruum. Some principles have been isolated, but are not yet employed to any extent in medicine. The dose of the fluid extract is from 10 to 30 drops, after meals. The solid extract is given in pills, 2 to 8 grains.

Average dose.—1 gm. (15 grains).

Rhamnin. An Eclectic concentrate prepared from the bark and representing its activity. Dose 2 to 5 grains.

RHEUM. U. S. Rhubarb.

Rhei Radix. Br. Rhubarb Bark.

"The dried rhizome and root of *Rheum officinale*, Baillon; *Rheum palmatum*, Linné; and the var. *tanguticum*, Maximowicz (Fam. *Polygonaceæ*); or other species of *Rheum*, grown in China and Thibet, and deprived of most of the bark and carefully dried." <U. S.

"The erect rhizome or so-called root of *Rheum palmatum*, Linn.; *Rheum officinale*, Baill.; and probably other species; collected in China and Thibet, and deprived of more or less of its cortex and dried." <Br.

The rhubarb root of commerce is mostly imported from Asia, and is variously manipulated and made up into attractive forms to retail in this country. The trimmings and sawdust of the rhubarb which is so prepared, furnish the greater amount of that which is used for manufacturing purposes. An extract, fluid extract, tincture and sweet tincture are official in the U. S. Rhubarb is highly esteemed as both a cathartic and an astringent. It is also chewed as a tonic to digestion and to correct stomach disorders.

Average dose.—1 gm. (15 grains).

A number of principles and acids have been obtained from rhubarb, among which the following, which are more important, may be mentioned:

Chrysophanic Acid. This crystallizes in golden-yellow needles or plates which are soluble in ether, alcohol or benzene.

Chrysophan. A glucoside which is decomposed by dilute acids into rheumatic acid and sugar.

RHIZOMA—RHIZOME.

This name is given in botany to the subterranean stem, from which the real roots extend below, and from which the roots or leaves extend above. The rhizome is the rootstalk from which the plant puts forth shoots or leaves annually.

The same remarks apply to the use of this term in pharmacy as are noted under Radices, which see.

RHEADOS PETALA. Br. Red Poppy Petals.

"The fresh petals of *Papaver Rhœas*, Linn." <Br.

The petals are of a bright scarlet color, and are used chiefly for the coloring they impart to water. Rhœadic and papaveric acids are obtained from the petals.

RHUS GLABRA. U. S. Sumach.

"The fruit of *Rhus Glabra*, Linné (Fam. Anacardiaceæ)." <U. S.

This shrub is found by fences and borders of woods and in waste fields throughout the United States. The leaves are rich in tannin and are extensively used for tanning leather and dyeing. The berries have an acid astringent taste and from them a wine called "rhus wine" may be made by packing them in a crock or cask, adding a little sugar and water, and allowing to ferment. The berries are astringent and cooling, and may be used in the form of decoction or fluid extract in mild diarrhœas, and as a gargle, astringent wash or injection. A fluid extract is official in the U. S. P.

Average dose.—1 gm. (15 grains).

RHUS TOXICODENDRON. Poison Ivy. Poison Oak.

"The fresh leaves of *Rhus radicans*, Linné (Nat. ord. Anacardiaceæ)." <U. S. 7th revision. Dismissed in the 8th.

This small shrub is found in fields and woods throughout the northern and middle United States and lower Canada. When broken, it exudes a poisonous juice, and even in its natural state emits an effluvia that is poisonous to some persons and produces itching, redness of the skin, blotches and swelling like the sting of insects. A remedy for this is the spirit of nitrous ether, or solution of lead acetate applied with a cloth over the affected part.

The fresh leaves are made into a tincture with alcohol, 1 to 4, which is much used in homeopathic practice. It is an irritant and possesses narcotic properties. It is used for rheumatism and is reputed to be valuable in paralysis and some forms of eruptive disease. It is seldom used except in the form of an alcoholic tincture.

RICINUS. Castor Oil Plant.

The leaves and seeds of *Ricinus communis*, Linné (Fam. Euphorbiaceæ). Native of southern Asia, cultivated in America and southern Europe. This is known as *palma christi* in some European countries.

Ricini Folia. Castor-Oil Leaves. They contain an acrid cathartic principle the same as in the fixed oil, expressed from the seeds.

A fluid extract is prepared from the leaves with diluted alcohol as a menstruum, dose 4 to 15 Cc. (1 to 4 fl.drachms).

Ricini Semina. Castor-Oil Beans. The beans or seeds contain the fixed oil, which is soluble in alcohol.

A fluid extract may be prepared from the seeds with alcohol as a menstruum. The dose is from 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

Ricini Oleum. The fixed oil expressed from the seeds, dose 1 to 8 fl.drachms. See *Oleum Ricini*, Part II.

ROSA CENTIFOLIA. Pale Rose.

"The petals of *Rosa centifolia*, Linné (Nat. ord. Rosaceæ)." <U. S. 7th revision. Dismissed in the 8th.

This is well known as the hundred-leaf rose or cabbage rose. It is the most fragrant of the roses and the petals are used in rose jars, combined

with other aromatics. This rose is the source of the otto or oil of rose and of the imported rose water, the fresh petals being distilled by steam. They may be preserved with salt for this purpose. The dried leaves were used in the preparation of the U. S. syrup of sarsaparilla compound, and in some unofficial preparations.

ROSA GALLICA. U. S. Red Rose.

Rosæ Gallicæ Petala. Br. Red-Rose Petals.

"The dried petals of *Rosa gallica*, Linné (Fam. Rosaceæ); collected before expanding." <U. S.

The petals of this species of rose are used in mixtures of cut herbs and in making confection of rose and many other preparations. A fluid extract is prepared which is used as a flavoring and color for preparations. They are astringent but are used chiefly for flavoring and coloring.

ROSMARINUS. Rosemary.

The leaves of *Rosmarinus officinalis*, Linné (Fam. Labiatae). Native of Europe, but cultivated in all temperate countries.

This is a shrubby evergreen 3 or 4 feet high, having an aromatic, pungent camphorous taste and odor due to its volatile oil. It is diuretic, carminative and galactagogue, and is used in medicine internally for nervous conditions and amenorrhœa, and externally in fomentations to relieve pain and muscular swellings. It is usually given in the form of hot infusion. Its virtues reside chiefly in its volatile oil which is obtained by distillation.

A fluid extract of the leaves is prepared but the volatile oil is more generally used.

RUBIA. Madder.

The root of *Rubia tinctorum*, (Fam. Rubiaceæ). Native of southern Europe, extensively cultivated for the production of its coloring matter, used for dyeing. In medicine it is used as an emmenagogue.

Dose of powdered root 2 to 4 gm. (30 to 60 grains).

Alizarin. $C_{15}H_8O_4$. This principle is obtained from madder, in the form of orange-red crystalline needles, soluble in ether, boiling water and alcohol. It is the basis of a series of red dyes, which were formerly prepared from madder, but are now chiefly obtained from coal-tar.

RUBUS. U. S. Blackberries.

"The dried bark of the rhizome of *Rubus villosus*, Aiton; *Rubus nigrobaccus*, Bailey; or of *Rubus Cuneifolius*, Pursh. (Fam. Rosaceæ)." <U. S.

The blackberry bush, as it is commonly known, grows in slashings and along fences and roadsides and streams, throughout northern and central U. S., Canada, and in portions of Europe. The berries yield a juice which may be fermented and made into blackberry wine. The root, which is official, is strongly astringent, and is employed for diarrhœa, dysentery etc. It is the effective ingredient in the blackberry cordials which are popular remedies for the diarrhœas of children.

Average dose.—1 gm. (15 grains).

A fluid extract is official in the U. S. P., dose 1 Cc. (15 minims).

RUBUS IDÆUS. Raspberry.

"The fruit of *Rubus idæus*, Linné (Nat. ord. Rosaceæ)." <U. S.

The raspberry, both red and black, is common throughout lower Canada, northern and middle United States and portions of Europe. The leaves are astringent and are sometimes used in medicine. The fruit is a well known table berry, from which raspberry wine may be made by fermentation and raspberry shrub by packing alternate layers of raspberries and sprinkling them with sugar, and then partly fermenting. Raspberry vinegar is made from raspberry juice or may be made by macerating raspberries in vinegar. Syrup of raspberry is official in many pharmacopœias.

A fluid extract is prepared from the leaves. Dose 30 to 60 minims.

RUDBECKIA LANCINIATA. Thimble-Weed.

This plant is a native of northern U. S. and Canada. Is balsamic, diuretic and tonic. Useful in chronic catarrhal inflammations of the urinary tract.

A fluid extract is prepared with diluted alcohol, dose 1 to 4 Cc. (15 to 60 minims).

RUDBECKIA PURPUREA. Black Sampson.

The root of the red sunflower, (Fam. Compositæ). Native of U. S. Growing about 4 feet high in barrens and thickets in western and southern states. It is alterative and diuretic and has properties the same as stillingia.

A fluid extract is prepared, dose 1 to 4 Cc. (15 to 60 minims).

RUMEX. Rumex. Yellow Dock.

"The root of *Rumex crispus*, Linné; and of some other species of *Rumex* (Nat. ord. Polygonaceæ)." <U. S. 7th revision. Dismissed in the 8th.

The sour or narrow-leaved dock, commonly called yellow dock because of the color of its root, is a door yard and garden weed found almost everywhere in northern North America and Europe. It is considerably used as a blood purifier and for scrofulous eruptions. A fluid extract was official in the U. S. P. and represents its valuable properties.

Rumicin. A principle, supposed to contain the active principle of the drug, has been isolated but is seldom used in medicine.

RUMEX ACETOSELLA. Sheep Sorrel.

The leaves of the field sorrel, (Fam. Polygonaceæ). The leaves have a pleasantly sour taste and are diuretic and refrigerant in action. They are used in medicine for scurvy and scrofulous eruptions and the fresh leaves are bruised and applied locally to sores and ulcers.

A fluid extract is prepared, dose 4 to 8 Cc. (1 to 2 fl.drachms).

RUTA. Rutæ Folia. Rue.

The leaves of *Ruta Graveolens*, Linné (Fam. Rutaceæ). Native of Europe. It has a peculiar balsamic odor and a bitter, acrid taste. Its properties reside in its volatile oil and a resin. It is used in medicine as an abortifacient and for the nervous diseases of females.

A fluid extract is prepared, dose $\frac{3}{4}$ to 2 Cc. (10 to 30 minims).

An oil is obtained by distillation. See *Oleum Rutæ*, Part II.

Rutin. A glucoside principle found in ruta, which occurs in needle-shaped crystals, splitting up into sugar and quercitrin. The dose is 1 to 2 grains.

SABAL. U. S. Sabal. Saw Palmetto.

"The partially dried ripe fruit of *Serenoa serrulata* (Roemer and Shultes), Hooker filius (Fam. Palmæ)." <U. S.

This is a species of palm native in the southern U. S. The medicinal properties of the fruit are tonic and nutrient, having special action upon the reproductive organs, the prostate gland and the bronchial mucous membrane. Its principal use is as a genital stimulant.

A fluid extract is prepared, dose 2 to 4 Cc. ($\frac{1}{2}$ to 1 fl.drachm).

SABADILLA. Cevadilla.

The dried, ripe seeds of *Schoenocaulon officinale*, (Fam. Melanthaceæ). Native of Mexico. A bulbous plant yielding small seeds which contain veratria and veratric acid. It is irritant and rubefacient when employed externally and depresses the heart action and nervous system when given internally.

A fluid extract is prepared, dose $\frac{1}{3}$ to 1 Cc. (5 to 15 minims).

Sabadilline. An alkaloid obtained from sabadilla and similar in action to veratrine. A sulphate of this alkaloid is prepared which is more soluble.

Veratria. A crystalline alkaloid representing the medicinal properties of the seed. See *Veratrina*, Part II.

SABBATIA. American Centaury.

The flowering plant from two species, *Sabbatia angularis* and *Sabbatia paniculata*, Pursh. (Fam. Gentianaceæ). Native of U. S. These plants have properties like *Gentian*; bitter, tonic and stomachic, and are useful in conditions where quinine is not required.

A fluid extract is prepared with diluted alcohol, dose 2 to 5 Cc. (30 to 75 minims).

A variety grown in the southern U. S. is called "Quinine flower," another grown in the middle and southern states is called "Wild succory," or "rose pink."

SABINA. U. S. Savine.

"The tops of *Juniperus Sabina*, Linné (Fam. Coniferæ)." <U. S.

This is an evergreen shrub, native of the south of Europe. A volatile oil (Oil of Savine), is obtained by steam distillation from the tops and branches and in this the medicinal virtues of the plant seem chiefly to reside. It is an irritant and is reputed to so affect the uterus that if given to women during pregnancy there is danger of abortion. It is employed in small doses for rheumatism and may also be used externally. It is also given for worms in doses of 5 to 15 drops.

A fluid extract is official in the U. S. which well represents the properties of the plant.

Average dose of the drug.—0.5 gm. (7½ grains).

SACCHARUM. Sugar.

A variety of sugars are obtained from different plants, but the chief product is the cane sugar, from *Saccharum officinarum*, (Fam. Graminaceæ), the sugar cane. Native of India and southern Asia, but now cultivated throughout the world. Under the article *Saccharum*, in Part II., the processes for making sugar from various plants is described.

Sugar is a universal food in all countries, and is an ingredient in many of the medicines prepared, and in many of the articles of food produced for the use of man.

SAGEPENUM. Gum Sagepenum.

A gum-resin obtained from some species of *Ferrula*, somewhat resembling *asafetida* and *galbanum*. It is considered an intermediate between *asafetida* and *galbanum*. True *Sagepenum* is now seldom met with in the market. Factitious *Gum Sagepenum* is made by melting 3 parts of *asafetida* with 15 parts of *galbanum* and adding 1 part oil of turpentine. Its uses are similar to *galbanum*.

SALEP TUBERA. Salep.

Salep as it appears in the market consists of several species of *Orchis* and other plants of the Fam. *Orchidaceæ*, especially of the sub-order *Ophrydeæ*. The new tubers formed during the year, when they are collected, are peeled and dried. They contain about 48 percent. of *bassorin* (vegetable mucilage) and 27 percent. of starch. The tuber is powdered and forms a thick jelly when cooked with forty times its weight of water. It is nutritive and demulcent, and forms a nourishing food, or a good vehicle for acid medicines. It also forms a mucilage which may be used for emulsifying oils or suspending powders prescribed in this form.

SALIX. Willow.

The bark of *Salix alba*, Linné; and other species of *Salix*, (Fam. *Salicaceæ*). Native of Europe and America. This was formerly official in the U. S. but has been dismissed. Several species of Willow are found in the U. S. The bark is tonic and febrifuge and is the source of a principle, *Salicin*, similar in action to quinine, but less active as an antiperiodic. Preparations of the bark are useful in debility and malaria.

A fluid extract is prepared, dose 2 to 4 Cc. (30 to 60 minims).

Salicinum. Salicin. A neutral principle obtained from the bark of various species of *Salix*. It has properties like quinine and salicylic acid and may be advantageously used in acute rheumatism, and as an antiperiodic.

SALVIA. U. S. Salvia. Sage.

"The dried leaves of *Salvia officinalis*, Linné (Fam. Labiatae)." <U. S.

This herb is a native of southern Europe, and is cultivated in gardens throughout the U. S. It is used chiefly as a seasoning for meats and dressings, and as an aromatic tea, for its diaphoretic and sedative effects. The leaves are used for canker of the mouth, sore throat or soreness of the gums, and as a stomachic. An oil of sage is obtained by distillation, the greater part of which is *Salviol*.

Average dose. of powdered drug.—2 gm. (30 grains).

SAMBUCUS. Sambuci Flores. Br. Elder Flowers.

"The flowers of *Sambucus canadensis*, Linné (Nat. ord. Caprifoliaceæ)." <U. S. 7th revision. Dismissed from the 8th.

"The flowers of *Sambucus nigra*, Linn.; separated from the stalks." <Br.

This is a shrub, or small tree in different localities, growing throughout the U. S. and Europe. The fresh flowers are distilled by steam for making elder-flower water, and the dried flowers are used for making a diaphoretic infusion. The ripe berries are dried and used in certain species, and as a mild laxative, in the form of infusion. The juice of the berries may be used as a coloring for wines or liquors, or may be fermented and made into elderberry wine.

A fluid extract of the flowers may be prepared, dose 5 to 10 Cc. (1 to 2½ fl.drachms).

SANDARACA. Sandarac.

A resin which exudes from incisions made through the bark of *Calletris quadrivalvis*, (Fam. Coniferæ), and dries in the air in the form of long tears, which are pale-yellow, transparent and brittle. This resin is soluble in hot alcohol and is used to manufacture varnish and in making toothache gum for plugging decayed teeth.

SANGUINARIA. U. S. Bloodroot.

"The dried rhizome of *Sanguinaria canadensis*, Linné (Fam. Papaveraceæ); collected after the death of the foliage." <U. S.

This herb grows in moist woods and along the banks of streams throughout the northern and central United States. The fresh root, when broken, exudes an orange-red, acrid juice, which may be applied to remove warts etc. The dried root in powder is considerably used as an ingredient of condition powders for horses and as an emetic, in dose of 10 to 20 grains. A fluid extract and tincture are official in the U. S. P., and are used in cough medicines as a stimulant to the mucous membrane, especially in chronic bronchitis. The dose as an expectorant is from 1 to 5 grains of the powdered root, or an equivalent quantity of the liquid preparation.

Average dose.—0.125 gm. (2 grains).

Sanguinarine. $C_{15}H_{17}NO_4$. This alkaloid has been obtained from the root, and may be produced by exhausting *sanguinaria* with alcohol, by means of a water-bath percolator, distilling off most of the alcohol, adding water and solution of soda to precipitate, washing the precipitate with hot water, filtering through animal charcoal, concentrating and crystallizing. It is white, but yields very bright red salts with acids.

Sanguinarine Nitrate. This is prepared by dissolving *sanguinarine* in dilute nitric acid until neutralized, then concentrating and crystallizing. It is a dark-red powder, and is given in dose of $\frac{1}{20}$ to $\frac{1}{10}$ grain.

Sanguinarine Sulphate. This may be prepared in the same manner as the nitrate preceding, only using sulphuric instead of nitric acid.

Sanguinarin. This is an Eclectic concentration or resinoid prepared by pouring a concentrated alcoholic tincture of *sanguinaria* into cold water,

sanguinarin precipitating. This is then collected and dried. The dose is $\frac{1}{8}$ to $\frac{1}{2}$ grain.

SANGUIS DRACONIS. Resina Draconis. Dragon's Blood.

A rich red resin obtained from the fruit of *Calamus Draco*, a species of climbing palm; by beating or shaking the fruit in a bag, which breaks off the resin, which is then separated, melted and run into reed-moulds or masses as it appears on the market. Its solution is used for coloring some medicinal substances, varnishes and lacquers. Several species of this substance are derived from various sources, differing in their coloring value when mixed with other resins and compounds. It has no important medicinal value.

SANICULATA MARILANDICA. Sanicle.

The leaves and root of the plant, (Fam. Umbelliferae). Native of middle U. S. It is astringent and alterative, and is useful in treatment of syphilis, leucorrhœa, diarrhœas and dysenteries. It has an acrid, bitter taste.

Dose of the leaves or root, 2 gm. (30 grains).

SANTALUM CITRINUM. Yellow Santalwood.

The wood of *Santalum Freycinetianum*, M. Gandichaud (Fam. Santalaceae). Native of Sandwich and Feejee Islands. This comes to the market as hard, heavy chips of yellowish color, having a peculiar balsamic odor and taste. This is the source of santalwood oil which is distilled from the chips by steam distillation. The ground wood is used in sachets and perfumes.

A fluid extract may be prepared with alcohol, dose 5 to 10 Cc. (1 to 2½ fl.drachms).

It is used for the same purposes as santalwood oil.

SANTALUM RUBRUM. U. S. Red Saunders.

Pterocarpi Lignum. Red Saunders Wood. Red Sandal-wood. Br. 1885.

"The wood of *Pterocarpus santalinus*, Linné filius (Fam. Leguminosae)." < U. S.

"The heart-wood of *Pterocarpus santalinus*, Linn. f." < Br. 1885.

The tree from which the wood is obtained is native of India. The heart-wood is of a deep, blood-red color, and is furnished to retailers ground to a coarse powder. It is used chiefly for coloring alcoholic tinctures and has no distinctive medicinal properties.

SANTONICA. U. S. Levant Wormwood.

"The dried unexpanded flower-heads of *Artemisia pauciflora*, (Ledebour), Weber (Fam. Compositae)." < U. S.

These unexpanded flower-heads which are commonly known as "worm-seed," are obtained from a species of *Artemisia* grown in the Levant, and commonly known as *Artemisia maritima*. It is the source of santonin, which is extensively used in mixtures of drugs used as worm medicines. From it an essential oil, (oil of wormseed), is obtained by steam distillation, of which the principle constituent is cineol, $C_{10}H_{18}O$. The real virtue of the drug, however, is in the crystallizable principle, **santonin**, which is obtained from it, and which is official in all pharmacopœias. See part II.

SAPONARIA. Soapwort.

The root of *Saponaria officinalis*, (Fam. Caryophyllaceae). Native of Europe and America. This root is inodorous, has a sweetish taste and afterwards acrid. It yields saponin; is alterative, diuretic and diaphoretic. Useful in chronic rheumatism, syphilis and skin diseases. It is used in washing silks and other fabrics which would be affected by soap.

A fluid extract is prepared, dose 1 to 4 Cc. (15 to 60 minims).

Saponin. This principle is obtained from this root, as well as from some other plants.

SAPPAN. Sappan Wood.

The heart wood of *Cæsalpinia Sappan*, Linné (Fam. Leguminosae). This tree is a native of India and is official in the Ind. and Col. Addendum. It is

used as a dye and also possesses astringent properties. It is quite similar to "Brazil wood" which is a well-known red dye-wood having properties like logwood. It may be used as an astringent in medicine, or for coloring medicinal preparations.

SARRACENIA. Pitcher Plant.

The root of *Sarracenia purpurea*, (Fam. Sarraceniaceæ). Native of U. S. Known as the side-saddle flower. Grows about mud lakes and in wet meadows, has evergreen leaves and a pitcher-form hollow swelling in the middle with wing-like appendages. The flower-cup holds about an ounce and is generally filled with water. The root is tonic, laxative and diuretic. Useful in constipation, dyspepsia and torpid liver.

A fluid extract is prepared, dose 1 to 2 Cc. (15 to 30 minims).

Sarracenia Flava. Trumpet Plant. A similar plant found in the southern U. S. Properties and uses like the foregoing.

SARSÆ RADIX. Jamaica Sarsaparilla.

Sarsæ Radix. Br. **Sarsaparilla.**

"The dried root of *Smilax ornata*, Hook. f. Imported from Costa Rica, and commonly known as Jamaica Sarsaparilla." <Br.

The dried root of *Smilax ornata*, Hooker filius (Fam. Liliaceæ). Native of Costa Rica and probably indigenous with other species grown in Central America. This root comes to the market mostly through Jamaica ports, where it is collected from surrounding territory. It is quite similar to Honduras Sarsaparilla and its properties and uses are the same.

SARSAPARILLA. U. S. Sarsaparilla.

"The dried root of *Smilax Medica*, Chamisso and Schlechtendal; *Smilax papyracea*, Duhamel; *Smilax ornata*, Hooker; or a dried root known commercially as Honduras Sarsaparilla, which is probably obtained from *Smilax officinalis*, Knuth (Fam. Liliaceæ)." <U. S.

Honduras sarsaparilla, which is considered the best variety obtainable in this country, is imported from stations on the bay of Honduras, and comes originally in bundles two or three feet in length, bound around with a long piece of the root. Mexican sarsaparilla is also much used, but is not considered so valuable as the Hondurian. A variety of *smilax* grown in China and Japan is known as China root and is used for similar purposes as other sarsaparillas.

Among physicians sarsaparilla is not considered of much value as a remedy, but among the people at large it is thought to be possessed of wonderful virtues as a tonic and purifier of the blood. It is generally combined with other medicines as an alterative and blood medicine. A compound decoction, fluid extract and compound fluid extract of sarsaparilla are official in the U. S. P.

Some principles have been isolated from the root but they are not important and are seldom used in medicine.

Average dose.—2 gm. (30 grains).

SASSAFRAS. U. S. Sassafras.

"The bark of the root of *Sassafras variifolium*, (Salisbury); O. Kuntze (Fam. Lauraceæ)." <U. S.

Sassafras bark is used in this country in mixtures of cut drugs and as an ingredient in blood medicines, also in the form of infusion as a tea which is drunk as a table beverage in some parts of the country. In powder is an ingredient of horse and cattle powders. Sassafras oil is distilled from the fresh roots, usually by steam.

A fluid extract is prepared with 75% alcohol, dose 2 to 5 Cc. (30 to 75 minims).

Sassafras Medulla. U. S. **Sassafras Pith.**—

"The pith of *Sassafras variifolium*, (Salisbury); O. Kuntze (Fam. Lauraceæ)." <U. S.

The pith of sassafras stems, when infused with water, yields a bland mucilage which is considerably employed in cough medicines and in catarrhal conditions, either of the throat, stomach, intestines or bladder.

It is also used for bathing the eyes when inflamed, or as a soothing application to irritated skin, chaffing, sunburn etc.

Sassafras Radix. Br. Sassafras Root.—

"The dried root of *Sassafras officinalis*, T. Nees and Eberm." <Br.

In Great Britain the root is gathered with the bark on it and furnished as sassafras; it is usually cut in chips or shavings.

SATUREJA HORTENSIS. Summer Savory.

The leaves of the plant (Fam. Labiatæ), chiefly used as a flavoring, but may be employed in medicine as a carminative and stimulant.

A fluid extract is prepared, dose 4 to 8 Cc. (1 to 2 fl.drachms).

SCROFULARIA. Figwort.

The entire plant, *Scrofularia Nodosa*, (Fam. Scrofulariaceæ). Native of North America. It has a bitter acrid, nauseous taste, and is diuretic, alterative and anodyne. Useful in scrofula, glandular enlargements and skin eruptions. It may be applied locally to indolent sores and ulcers.

A fluid extract is prepared, dose 2 to 4 Cc. (30 to 60 minims).

SCAMMONIÆ RADIX. Br. Scammony Root.

"The dried root of *Convolvulus Scammonia*, Linn." <Br.

This should be distinguished from the resin which exudes from the root which is described in the following text.

The root yields to 90% alcohol a resin which should have the properties of Scammony resin, for which the formula is given in Part II.

SCAMMONIUM. U. S., Br. Scammony.

"A gum-resin obtained by incising the living root of *Convolvulus Scammonia*, Linné (Fam. Convolvulaceæ)." <U. S.

"A gum-resin obtained by incision from the living root of *Convolvulus Scammonia*, Linn.; known in common as Virgin Scammony." <Br. 1885. Now changed to *Scammonia Resina*, which see.

The creeping plant from the root of which scammony is obtained, is found in Syria and some of the islands of the Mediterranean, and is obtained by cutting off the top of the thick fresh root and scraping off the milky juice which exudes, collecting it and drying it by exposure to the air. It usually has considerable admixture of inert substances which are added to absorb the juice or to increase the product.

This is a cathartic, its power depending largely upon its purity and for that reason the prepared scammony-resin is generally used when definite results are desired. The dose of scammony is from 5 to 15 grains.

Average dose.—0.256 gm.=250 milligrammes (4 grains).

Scammony Resin. The formula for preparing this resin will be found under the heading *Scammonia Resinæ*. (See Part II).

SCILLA. U. S., Br. Squill.

"The bulb of *Urginea maritima*, (Linné); Baker (Fam. Liliaceæ); deprived of its dry, membranous outer scales, cut into thin slices and carefully dried, the central portions being rejected." <U. S.

"The bulb of *Urginea Scilla*, Steinh.; divested of its dry, membranous outer scales, cut into slices and dried." <Br.

This plant, of which the bulb is the medicinal portion, grows in sandy soil along the shores of countries bordering upon the Mediterranean. It is considerably used in medicine as a diuretic and expectorant, and is a favorite ingredient of cough syrups; the vinegar, tincture and fluid extract being the forms in which it is usually prescribed. Several principles and alkaloids have been obtained from squill, but they have not been used in medicine.

Average dose of the powdered drug.—0.125 gm.=125 milligrammes (2 grains).

Scillipicrin. A white, amorphous, bitter principle, obtained from squill. It is a powerful diuretic. Dose, subcutaneously, $\frac{1}{3}$ to 1 grain, once daily.

Scillitin. A concentrate or principle obtained from scilla and representing its activity. Dose $\frac{1}{4}$ to 1 grain.

SCOPARIUS. U. S. Scoparius. Broom.

Scoparii Cacumina. Br. Broom Tops.

"The dried tops of *Cytisus Scoparius*, (Linné); Link (Fam. Leguminosæ)." <U. S.

"The fresh dried tops of *Cytisus scoparius*, Link." <Br.

This is a shrub common in Europe, and somewhat cultivated in gardens in the U. S. It is cathartic and diuretic, and is considerably used in dropsy and incipient albuminuria. A fluid extract is official in the U. S. P.

Average dose.—1 gm. (15 grains).

Scoparin, which is a principle obtained from it, represents its diuretic and cathartic properties. It may be obtained by evaporating a decoction of the tops, purifying and crystallizing from the purified solution. It is employed in dropsy etc.

Sparteine, which is a liquid alkaloid, is obtained from the mother-waters after the crystallization of scoparin. It paralyzes the motor nerve centers and the spinal cord, but is used chiefly as a heart stimulant and regulator, generally as an alternative with digitalis in some form.

Sparteine Sulphate, which is a crystalline salt, is generally used instead of the alkaloid, the dose is from $\frac{1}{6}$ to $\frac{1}{4}$ grain. It is claimed to have no cumulative effect, and is, therefore, preferable to digitalis.

SCOPOLA. U. S. Scopolia.

"The dried rhizome of *Scopola Carniolica*, Jacquin (Fam. Solanaceæ); yielding, when assayed as directed, not less than 0.5 percent. of mydriatic alkaloids." <U. S.

This plant seems to be a connecting link between belladonna and hyoscyamus, having characteristics similar to both, and yielding like medicinal principles.

It was first introduced into the 8th revision of the U. S. P. Although its alkaloid Scopolamine, and several of its salts had been used for some time in medicine.

A fluid extract of the root is official in the U. S. P. Also Scopolamine Hydrobromide, which will be noticed in Part II.

Average dose of powdered root.—0.45 gm.=45 milligrammes ($\frac{3}{4}$ grain).

SCUTELLARIA. U. S. Scullcap.

"The dried plant of *Scutellaria lateriflora*, Linné (Fam. Labiatae)." <U. S.

This herb is found in moist, open places throughout the northern and central United States. It is used as a nervine in convulsive conditions and nervous prostration. A fluid extract is official in the U. S. P., the dose being 15 to 60 minims.

Average dose of drug.—1 gm. (15 grains).

Scutellarin. This is an Eclectic concentration, and may be made in the manner directed under that heading. The dose is from 1 to 4 grains.

SEMINA — SEEDS.

Semences, Fr.; Samen, Ger.

In botany the seed is the fertilized ovule, having the embryo formed within it, which, under favorable conditions will germinate and produce a new plant like the parent from which it came. In commerce the name is frequently applied to something entirely different, as "wormseed," which is the unexpanded flower-heads of *santonica*; "seed-lac," which is the granular lac removed from twigs etc. In pharmacy seeds are often called fruit, as caraway fruit (seed); coriander fruit (seed) etc.

In the U. S. pharmacopœia the names of seeds are not followed by the Latin or English word meaning seed, unless some other part of the plant is official, but in the Br. P. the name of the plant is followed by the Latin name for seed. Some European pharmacopœias correspond with the U. S. in their titles for seeds while others have the Latin name for seed—*Semen*—preceding the name of the plant.

In this work the official seeds are noted in the alphabetical order of subjects, and most of the unofficial seeds are otherwise noted, so they will not be further considered under this heading.

SENECIO. Life Root.

The root of *Senecio aureus*, Linné (Fam. Compositæ). Native of North America. A plant growing on moist ground near streams or marshes, having a thin running rhizome with many rootlets. It is tonic, diuretic, diaphoretic and expectorant and has a peculiar tonic action on the female generative organs. It is chiefly used for female disorders, and having a peculiar aromatic taste is useful in compound female remedies.

A fluid extract is prepared, dose 2 to 4 Cc. (30 to 60 minims).

Senecin. A concentration prepared from this plant and used in Eclectic practice. Dose 1 to 5 grains.

SENEGA. U. S. Senega.

Senegæ Radix. Br. Senega Root.

"The dried root of *Polygala Senega*, Linné (Fam. Polygalacæ)." <U. S.

"The dried root of *Polygala Senega*, Linn." <Br.

The small plant of which the root is official is found throughout the northern and central United States, east of the Rocky Mountains. Its preparations are used mainly as stimulant, expectorant and diuretic, and for catarrhal conditions. The fluid extract and syrup are official; also the syrup of squill compound or Hive Syrup, containing senega, which is a popular remedy for coughs and croup.

Average dose of powdered drug.—1 gm. (15 grains).

Senegin or **Polygalic Acid** is prepared from senega, and has been proven identical with **saponin**, which is found in quillaja bark, sarsaparilla and some other drugs. It has a peculiar acrid taste and effect, causing an abundant flow of saliva and a sickish sensation of the throat and fauces. This is the principal medicinal constituent of the root, the dose being $\frac{1}{4}$ to 1 grain, usually in pills, or mixed with some other powder to avoid its acrimonious effect.

SENNA. U. S. Senna.

"The dried leaflets of *Cassia acutifolia*, Delile (Alexandria Senna); or of *Cassia angustifolia*, Vahl. (Indian Senna) (Fam. Leguminosæ)." <U. S.

Average dose of powder.—4 gm. (60 grains).

Senna Alexandria, Alexandrian Senna.—The dried leaflets of *Cassia acutifolia*, Delile.

Senna Indica, East India Senna, Tinnively Senna.—The dried leaflets of *Cassia angustifolia*. From plants cultivated in southern India. <Br.

Alexandria senna is obtained chiefly from upper Egypt and other parts of Africa. The leaflets are gathered from a small shrub. The Tinnively senna is obtained from Hindostan, and is the kind mostly used, although it has only about two-thirds the cathartic power of the Alexandrian senna; it is employed in a variety of forms as a purgative. A fluid extract, confection, compound infusion, compound syrup and powder are official in the U. S. P., and it is also the laxative ingredient in many compounds and cordials which are extensively used, as Worm Syrups or Specifics, Fig Syrup etc. By treating senna first with alcohol and then drying, the property in it which produces griping is removed; the "alcoholized senna," as it is called, making an admirable cathartic. This may be powdered and used with aromatics as a physic.

Cathartic Acid. This represents the active purgative principle of senna and may be obtained from it by a complicated process. It is of the nature of a glucoside and may be resolved into cathartogenic acid and sugar.

SERPENTARIA. U. S. Virginia Snakeroot.
Serpentariæ Rhizoma. Br. Serpentry Rhizome.

"The dried rhizome and roots of *Aristolochia Serpentina*, Linné; *Virginia Serpentina* or *Aristolochia reticulata*, Nuttall; (*Texas Serpentina*) (Fam. *Aristolochiaceæ*)."><U. S., Br.

The herbaceous plant with a perennial root is found in this country in the middle and southern and western states; varieties are also found in Mexico and the West Indies. It is an aromatic stimulant and tonic acting as a diaphoretic and diuretic, and is considerably employed as an ingredient of medicines for intermittent fevers and for other febrile conditions. A fluid extract and tincture are official in the U. S. P. The dose of the fluid extract is from 20 to 30 minims.

Average dose of the powdered drug.—1 gm. (15 grains).

SESAMUM. Benné.

The seeds of *Sesamum Indicum*, (Fam. *Pedaliaceæ*), cultivated in southern U. S. It yields a fixed oil, bland and odorless, that will keep a long time without becoming rancid. It has no valuable medicinal properties other than olive oil or almond oil, but may be used as a vehicle for some medicines more advantageously than the oils mentioned.

The dose of the oil internally is from 8 to 32 Cc. ($\frac{1}{4}$ to 1 fl.ounce).

SEVUM PRÆPARATUM. U. S. Mutton Suet. Prepared Suet.

"The intestinal fat of the abdomen of the sheep, (*Ovis aries*), Linné; purified by melting and straining."<U. S., Br.

This fat, which is commonly known as "mutton tallow," consists of stearin, palmitin and olein; its melting point is between 48.5° and 50°C., and its sp. gr. is 0.937 to 0.952. It is used in making cerates and ointments, and as an application to irritated surfaces, ulcers etc.

Sebum Salicylicum. Germ. *Salicyltalg*.—Salicylic acid 2 parts, benzoic acid 1 part, mutton suet 97 parts; melt the mutton tallow and incorporate the acids, in fine powder, and stir while cooling.

Sebum Bovinum. Beef suet, *Suif de Bœuf*, Fr.; *Grasso Bovino*, It.; and *Sebum Vitulinum*, Veal Suet, *Suif de Veau*, Fr.; are prepared in the same manner as mutton suet.

SILPHIUM. Rosin Weed.

The plant, *Silphium lancinatum*, (Fam. *Compositæ*), found in western U. S. It is diaphoretic, tonic, alterative and emetic. Useful in dry coughs, asthma, bronchitis, and for bladder complaints.

A fluid extract is prepared, dose 2 to 4 Cc. (30 to 60 minims).

SIMARUBA. *Simaruba* Bark.

The bark of the root of *Simaruba officinalis*, (Fam. *Simarubaceæ*). Found in South America and the West Indies. Its properties are like quassia. It is a bitter tonic and astringent. Useful in dyspepsia and for general debility and dysentery.

A fluid extract is prepared, dose 1 to 4 Cc. (15 to 60 minims).

Quassin. This is the bitter principle obtained from this bark, and is identical with the same named preparation from *Quassia Wood*. Dose 1 to 5 grains.

SINAPIS. Mustard.

Both the black and white mustard seed are official in the U. S. and Br. P., as follows:

Sinapis Alba. U. S. *Sinapis Albæ Semina.* Br. White Mustard Seed.—"The dried ripe seed of *Sinapis alba*, Linné (Fam. *Cruciferae*)."><U. S.

"The dried ripe seeds of *Brassica alba*, Boiss."<Br.

Sinapis Nigræ. U. S. *Sinapis Nigræ Semina.* Br. Black Mustard.—"The seeds of *Brassica Nigra*, (Linné), Koch (Fam. *Cruciferae*)."><U. S.

"The dried ripe seeds of *Brassica nigra*, Koch."<Br.

Ground or powdered mustard is prepared in many ways as a relish for the table, and is used as a stimulating application in the form of plaster (*sinapism*) and paper (*charta Sinapis*), which are put up in packages and sold as **mustard leaves**. A fixed oil is obtained by expression from ground mustard seed, and the "cake" is used for making the mustard preparations.

A volatile oil is obtained by moistening the "cake," allowing it to stand for 24 hours and distilling. This is a very pungent oil and is considerably used in preparations for external use or inhalants for headache, catarrh etc.

The whole mustard seeds are frequently added to cider, and act as a preventative by forming a mucilaginous coating on the surface of the liquid in the cask which excludes the air and prevents change. The mustard seeds, when swallowed whole, are said to relieve obstinate hiccough and colic.

SMILAX. Rhizoma Chinæ. China Root.

The tuberous root of a climbing plant native of China and Japan, and of a similar plant found in the U. S. (*Fam. Smilacæ*). The foreign variety is known as China root, and the U. S. plant has the synonym *Coccolmegia*. It has a bitter, acrid taste and is alterative and diuretic, particularly useful in dropsy. Properties like *sarsaparilla*.

A fluid extract is prepared, dose 1 to 2 Cc. (15 to 30 minims).

SMILAX SARSAPARILLA. Bamboo Brier Root.

The root of *Smilax Sarsaparilla*, (*Fam. Smilacæ*), found in the southern U. S. It has a long creeping cylindrical root with but few rootlets, with a thick bark, brown externally and white inside. It is tonic and alterative and useful in syphilis and rheumatic gout, and generally as a blood cleanser. It is an ingredient of some successful proprietary blood purifying compounds.

A fluid extract is prepared, dose 2 to 8 Cc. ($\frac{1}{2}$ to 2 fl.drachms).

Smilacin. An Eclectic concentrate from bamboo brier root, representing its medicinal virtues. Dose 2 to 5 grains.

SOLANUM PANICULATUM. Jurubeba.

The root of a Brazilian drug, very highly recommended in obstructions of the bowels and liver, and in vesical catarrh and constipation. It is a diuretic and hydragogue cathartic in jaundice and dropsical affections, and in small doses an alterative and tonic.

A fluid extract of the root is prepared, dose $\frac{1}{3}$ to 2 Cc. (5 to 30 minims).

SOLIDAGO. Golden Rod.

The leaves and flowering tops of *Solidago odora*, Aiton (*Fam. Compositæ*). Native of North America. This common roadside and pasture weed has a slight aromatic odor and a sweetish taste. It is somewhat stimulant and carminative but has no marked medicinal action. Its virtue consists chiefly in its volatile oil which may be obtained in small quantities by distillation.

A fluid extract is prepared, dose 2 to 5 Cc. (30 to 75 minims).

Solidago Virgaurea. A European variety has lately been introduced in Europe as a diuretic in ascites caused by cirrhosis of the liver and heart disease.

SPIGELIA. U. S. Pinkroot.

"The dried rhizome and roots of *Spigelia marilandica*, Linné (*Fam. Loganiacæ*)."*<U. S.*

This is generally known as pinkroot and is chiefly obtained in the southern United States. Some similar plants, also, are native of South America and the West Indies. It is used entirely as an anthelmintic, and the combination of "Pink and Senna" is a familiar domestic remedy in all parts of the country. An infusion of the root represents its medicinal properties, but the fluid extract or compound fluid extract of pink root and senna are more generally prescribed by physicians. The dose of the powdered root for children 3 to 5 years old is from 10 to 20 grains, and for an adult 1 to 2 drachms; excessive doses are dangerous and may prove fatal. It is usually given with, or followed with, a cathartic.

A fluid extract is official in the U. S. Average dose 4 Cc. (1 fl.drachm).

Spigeline. This principle has been obtained from the root, but is not sufficiently known to be recognized as a medicinal agent.

SPONGIA. Sponge.

Spongia officinalis, Linné. Found in the Mediterranean, the Gulf of Mexico, and elsewhere in the warm oceans and seas.

A variety of sponges are gathered and found in the market, suited for various purposes. The finest variety for surgical use is the Turkey Cup sponges. The Sheep's-Wool sponges are very tough and excellent for bathing and washing purposes, and for veterinary use. Many other kinds of sponge are used.

Sponges are prepared in various ways for surgical and medicinal use. See Part II.

STAPHISAGRIA. Staphisagria.

Staphisagriae Semina. Br. Stavesacre Seeds.

"The ripe seeds of *Delphinium Staphisagria*, Linné (Fam. Ranunculaceæ)." <U. S.

"The dried ripe seeds of *Delphinium Staphisagria*, Linn." <Br.

The plant which produces these seeds is a native of the south of Europe, where it grows one or two feet high. The seeds grow in straight, oblong capsules which contain five seeds. They are of similar nature to larkspur seeds, and an infusion is used for destroying lice and other parasites. A tincture of the seeds is given internally for some forms of eczema and as an application for rheumatic affections.

Average dose.—0.065 gm.=65 milligrammes (1 grain).

A fluid extract is official in the U. S. Average dose 0.05 Cc. (1 minim).

Delphinine, an alkaloid principle obtained from the plant, has been separated into several other substances, as staphisaine, delphinoidine, delphisine and staphisagrine.

STATICE. Marsh Rosmary.

A plant growing in marshes or wet places in northern U. S. and Europe, (Fam. Plumbaginaceæ). The root of this plant is very astringent and is excellent in the form of decoction as a gargle for sore throat; also as an injection for prolapsed uterus or leucorrhœa and gonorrhœa.

A fluid extract is prepared, dose 2 to 4 Cc. (30 to 60 minims).

STICTA PULMONARIA. Lung Moss.

This is a plant having expectorant and simple bitter properties. Useful in pulmonary affections with weakness or general debility. It is best given in the form of hot water infusion, dose $\frac{1}{2}$ to 1 fl.ounce.

STILLINGIA. U. S. Queen's Root.

"The dried root of *Stillingia sylvatica*, Linné (Fam. Euphorbiaceæ)." <U. S.

Stillingia is an herbaceous plant growing two or three feet high, and indigenous to the southern United States. The plant is commonly called "Queen's Delight." The root, which is the part used in medicine, is a valuable alterative remedy, extensively used instead of mercurials in the treatment of syphilitic affections, scrofula, eruptions and glandular inactivity. It is an ingredient in many of the popular sarsaparillas and blood and liver remedies. A green plant fluid extract and a fluid extract from the dried root are prepared, and an oil is obtained by steam distillation. A compound syrup of *stillingia* has been very popular, and a preparation known as "Succus Alterans," of which one of the chief ingredients is *stillingia*, has met with much favor among practitioners. The dose of fluid extract of *stillingia* is from 30 to 40 minims.

Average dose of powdered drug.—2 gm. (30 grains).

Stillingine. This alkaloid has been obtained from the root and forms salts with acids, which may be obtained in crystalline form.

Stillingin. A concentration by this name is employed to a considerable extent by Eclectics. It seems to represent the properties of the root.

STRAMONIUM. Thornapple.

Both the leaves and seeds of stramonium are official in the U. S. P., Br., and most other pharmacopœias. It is an annual plant of rank growth, common in temperate countries throughout North America and Europe.

Stramonii Folia. Br. **Stramonium.** U. S. **Stramonium Leaves.**—"The dried leaves of *Datura Stramonium*, Linné (Fam. Solanaceæ); yielding, when assayed as directed, not less than 0.35 percent. of mydriatic alkaloids." <U. S.

Stramonii Semena. Br. **Stramonium seeds.**

"The dried ripe seeds of *Datura Stramonium*, Linn." <Br.

The leaves and seeds of the plant both possess narcotic properties quite similar to belladonna, and the preparations of the plant are employed in medicine for similar purposes as belladonna. The powdered leaves are considerably used as an ingredient of asthma powder, used by burning. Extract, fluid extracts and tinctures are prepared, also an ointment for external application. The dose of the fluid extract is from 10 to 20 minims. Preparations of stramonium are recommended for mania, epilepsy, neuralgia, spasmodic asthma, rheumatism etc.

Average dose of the powdered leaves or seeds.—0.065 gm. = 65 milligrammes (1 grain).

STROPHANTHUS. U. S.

"The ripe seed of *Strophanthus*, (Kombé), Oliver (Fam. Apocynaceæ); deprived of its long awn." <U. S.

"The dried ripe seeds of *Strophanthus*, (Kombé), Oliver; freed from the awns." <Br.

This plant is a woody climber, native of Africa and Asia, and some varieties of it are used as Indian arrow poison. A tincture of the seeds is official in the U. S. and Br. This drug causes paralysis of the respiratory and other voluntary muscles. It lowers the rapidity of the pulse, at the same time increasing its force and volume. It is also used as a diuretic and in cardiac dropsy. The dose of the tincture is from 5 to 15 minims.

Average dose of powdered drug.—0.065 gm. = 65 milligrammes (1 grain).

Strophanthin. This principle has been obtained from the seeds and seems to represent their activity. It is used for similar purposes as the tincture, and is usually given in hypodermic injections in dose of $\frac{1}{300}$ to $\frac{1}{200}$ grain.

STYLOSANTHES. Pencil Flower.

The herb *Stylosanthes elatior*, Swartz (Fam. Leguminosæ). Native of U. S. A. uterine tonic and sedative. Useful to relieve irritability of uterus during the latter months of gestation, also to facilitate parturition.

A fluid extract is prepared, dose $\frac{2}{3}$ to 5 Cc. (10 to 75 minims).

SUCCINUM. Amber.

A fossil from *Pinites succinifer*, Gæppert (Fam. Conifera), now extinct. Chiefly obtained from the southern shores of the Baltic.

Amber is a fossil-resin supposed to have been produced as a turpentine in pine trees of prehistoric ages, which, having decayed, leave the resin in irregular pieces. It is obtained from mines found on the coast or is washed up by the sea. It resembles other resins except that it is harder. It melts when heated and is soluble in chloroform and, to a limited degree, in alcohol, ether and volatile oils. It is the source of oil of amber, which is used in medicine, and some other preparations which will be noticed in Part II.

SUMBUL. U. S. Sumbul.

Sumbul Radix. Br. Sumbul Root.

"The dried rhizome and root of an undetermined plant, probably of the family Umbelliferæ." <U. S.

"The dried transverse slices of the root of *Ferula Sumbul*, Hook. f." <Br.

This root is obtained from India where it is known as Sumbul or Jatamansi, and is used in incense and as an addition to perfumes, also in medicine. It

has an odor resembling musk, and is of the same order of plants as that from which asafetida is obtained. It is used in medicine as a nerve stimulant and as a tonic for the generative organs of females. A tincture is official in the U. S. and Br. pharmacopœias.

Average dose of powdered root.—2 gm. (30 grains).

SWIETENIA. African Mahogany.

The bark of *Swietenia Senegalensis*. Native of Africa. It is astringent, tonic and antiperiodic. Useful in malarial and typhoid fever.

A fluid extract is prepared, dose 1 to 4 Cc. (15 to 60 minims).

SYCOCARPUS RUSBYI. Cocillana.

The bark of the tree, (Fam. Meliaceæ). Native of Bolivia. It is laxative, tonic and expectorant. Useful in chronic tonsillitis, catarrh etc.

A fluid extract is prepared, dose $\frac{2}{3}$ to 2 Cc. (10 to 30 minims).

SYMPHYTUM. Symphyti Radix. Comfrey.

The root of *Symphytum officinale*, Linné (Fam. Boraginaceæ). Native of Europe and U. S. The root is demulcent, and slightly astringent. It is used in medicine as an ingredient in cough and catarrh preparations and for all conditions of the intestinal tract in which a demulcent and astringent may be useful. It is also employed by bruising the fresh root, in the form of a poultice for wounds, sores and inflamed surfaces, being chiefly useful as a demulcent.

The dose of the root is from 5 to 10 gm. in the form of decoction. A fluid extract does not represent the valuable properties of the root.

TAMARINDUS. U. S., Br. Tamarind.

"The preserved pulp of the fruit of *Tamarindicus indica* (Fam. Leguminosæ)." <U. S.

"The fruits of *Tamarindicus indica*, freed from the brittle outer part of the pericarp and preserved with sugar." <Br. 1898.

This mildly acid, laxative pulp is used in making confection of senna, and may be employed in making laxative confections.

TANACETUM. U. S. Tansy.

"The leaves and tops of *Tanacetum vulgare*, Linné (Nat. ord. Compositæ)." <U. S. 7th revision. Dismissed in the 8th.

Tansy is an herb, native of Europe, but now found in gardens, old fields, and along the roads in all parts of the northern and central United States. It has a strong aromatic odor, due to the volatile oil of tansy, which may be obtained from it by distillation. It is an aromatic bitter, and is considerably used as an addition to liquor and bitters. It is employed in domestic practice as a menstrual stimulant and abortifacient, but is considered poisonous and uncertain in its effects by physicians. It is usually given in the form of infusion, called tansy tea.

Tanacetin. A glucosidal principle has been isolated from tansy, and tannic acid has been obtained by its decomposition.

TARAXACUM. U. S. Dandelion.

Taraxaci Radix. Br. Taraxacum Root.

"The dried root of *Taraxacum officinale*, Weber (Fam. Compositæ); gathered in autumn." <U. S.

"The fresh and the dried root of *Taraxacum officinale*, Wiggers; collected in autumn." <Br.

The dandelion is an herbaceous plant found in almost all countries, abundant in fields, lawns, and along the road-side. Its bright yellow flowers give variety of color to the early spring landscape, but its root should not be gathered until August or September, when it is rich in medicinal properties. The root is much esteemed as a mild bitter tonic, and as a stimulant to the secretion of bile by its action on the liver. A juice is obtained from the fresh root and from the dried root an extract and fluid extract are prepared. It is

also much used as an ingredient of compound medicines, for the liver and digestive organs, and in diuretic medicines. Some principles have been isolated from it, but they are not employed in medicine.

Average dose.—8 gm. (120 grains).

A fluid extract is official in the U. S. Average dose 8 Cc. (2 fl.drachms).

A liquid extract is official in the Br., dose $\frac{1}{2}$ to 2 fl.drachms.

Solid extract of *Taraxacum* is official in most countries and is used as an ingredient in pill masses, dose 5 to 15 grains.

TEREBINTHINA. U. S. Turpentine.

Thus Americanum. Br. Frankincense.

"A concrete oleo-resin obtained from *Pinus palustris*, Miller; and from other species of *Pinus* (Fam. Pinaceæ)." <U. S.

"The concrete oleo-resin which is scraped off the trunks of *Pinus palustris*, Mill., and *Pinus Tæda*, Linn." <Br.

When fresh it is rather soft, and is then commonly known as pine pitch, when older it is a yellowish, opaque substance, commonly known as gum turpentine or gum thus. From the soft fresh pitch which is collected by "boxing" the trees, the oil of turpentine, or "spirits of turpentine" of commerce is distilled, leaving the residue, resin, or "rosin" of commerce.

This is used as a constituent in ointments, plasters, balsams etc., and may be made into a syrup like tolu, in the same manner.

TEREBINTHINA CANADENSIS. U. S., Br.

Canada Balsam. Canada Turpentine. Balsam of Fir.

"A liquid oleo-resin obtained from *Abies balsamea*, (Linné), Miller (Fam. Conifera)." <U. S.

"The oleo-resin obtained from *Abies balsamea*, Mill." <Br.

"A pale yellow and faintly greenish transparent oleo-resin, of the consistence of thin honey," becoming thicker when exposed.

This balsam is used extensively in making printing ink and some transparent varnishes, also on microscope slides and some kinds of spectacle glasses. In pharmacy it is employed in making some liquid balsams, and in some liniments.

THAPSIA.

The root of *Thapsia garganica*, (Fam. Umbelliferae). Native of southern Europe. It is tonic, purgative and emetic, locally irritant. Useful as a counter-irritant in rheumatism and bronchitis.

A fluid extract is prepared with alcohol, dose $\frac{3}{4}$ to 5 Cc. (10 to 75 minims).

THEA. Theæ Folia. Tea.

The leaves of *Camellia Thea*, Link (Fam. Ternstroemiaceæ). Native of China and Japan. This is chiefly imported from the Orient, but some plantations in South Carolina, in the U. S. are now furnishing a very fair product. Tea contains from 1 to 4 percent. of theine, which is the same as caffeine. It is universally used as a table beverage but is seldom employed purposely as medicine although it is much used to relieve fatigue and exhaustion, in the form of hot infusion, known as "Tea."

A fluid extract of tea is prepared with $\frac{1}{3}$ alcohol, dose 1 to 4 Cc. (15 to 60 minims).

THEOBROMA. Cacao.

The seeds of *Theobroma Cacao*, Linné (Fam. Sterculiaceæ). Grown in tropical America. As these seeds are obtained they are about the size of small almonds, and have a husk or shell which is thin and fragile. When gathered the seeds are laid in heaps on the ground, exposed to the sun during the day but covered with leaves at night. By this treatment they "sweat" and lose their bitter taste. They are afterwards dried. The dried seeds consist of about 85 percent. kernels, 12 percent. shells, and contain from 1 to $1\frac{1}{2}$ percent. of theobromine which is nearly identical with theine and caffeine.

The kernel contains about 50 percent. of a fixed oil, cacao butter, from 14 to 18 percent. of starch and 13 to 18 percent. of proteids, peculiar to this plant, together with a little sugar. The seeds of theobroma are roasted for preparing chocolate and the greater part of the fixed oil is removed for making cacao butter. The process employed for making these products will be more fully explained in Part II.

Theobromine. The alkaloid obtained from Theobroma is nearly the same as theine obtained from tea and caffeine obtained from coffee. Its uses and dose are the same as caffeine.

THUJA. Arbor Vitæ.

The fresh twigs from the tops of *Thuja occidentalis*, Linné (Fam. Coniferae). Native of Canada and northern U. S. This was formerly official in the U. S. P. but has been dismissed. The twigs have a balsamic odor and a pungent, camphoraceous, bitter taste. The principle constituents of the plant are a volatile oil, a bitter principle called pinipicrin, and a substance called thujin, soluble in water and in alcohol. It is employed more especially by the homœopathic physicians in the treatment of catarrh and bronchitis, and as an alterative.

A fluid extract is prepared from the fresh twigs with alcohol, dose 2 to 5 Cc. (30 to 75 minims).

A tincture is prepared with the fresh twigs 1 part in alcohol 5 parts, by maceration. The dose of this tincture is from 5 to 15 Cc. (1 to 4 fl.drachms), but in homeopathic practice a much smaller quantity is given.

THYMUS. Folia Thymi. Thyme.

The leaves of *Thymus vulgaris*, Linné (Fam. Labiatae). Cultivated in all temperate countries. This is commonly known as garden thyme and is considerably used as a flavoring for food. It has a strong, aromatic odor, due to its volatile oil and contains the principles peculiar to the plant, cymene, thymene and thymol. It is stimulant, tonic and carminative, and may be used in the form of infusion internally.

A fluid extract is prepared, dose 2 to 5 Cc. (30 to 75 minims).

Oil of Thyme is official, see *Oleum Thymi*, Part II.

Thymol is prepared from Oil of Thyme, see *Thymol*, Part II.

TILIA. Tiliæ Flores. Linden Flowers.

The whole inflorescence, with the leaves or bracts properly belonging to it, of *Tilia vulgaris*, Hayn; *Tilia parvifolia* and *Tilia Grandiflora*, Erhardt (Fam. Scopolia). Native of Europe. Linden flowers are considerably used in Europe in the form of a tea or hot infusion as a diaphoretic and to relieve indigestion and nervousness. Linden tea is a favorite domestic medicine.

Dose 2 to 5 gm. (30 to 75 grains) of the drug in infusion.

American Linden. Baswood. Whitewood. This large tree is native of north eastern U. S. and has similar flowers as the European *Tilia*, which may be used for the same purpose.

TONCO SEMINÆ. Tonka or Tonquin Beans. Tonco Seeds.

The seeds of *Dipteryx odorata*, Willd. (Fam. Leguminosae). Native of Guiana; and *D. oppositifolia*, Willd., native of Brazil. Both varieties are large trees and produce a drupaceous fruit, or oblong-ornate pod, about the size of an egg, with a fibrous pericarp, enclosing a single seed. When ripe the seed is removed from the pod and sometimes steeped in rum and spread upon floors until a white crystalline crust has formed on the surface of the seeds. This crust is coumarin, which is much used in flavoring and perfumes. The seeds, covered with this crystalline crust, are seldom to be had by the retail trade, for manufacturers dissolve it for flavoring purposes and sell the seeds after its removal.

Tonca beans are employed for making a tincture or extract of tonca, used in flavorings and perfumes and have been familiarly known in the past as "snuff beans;" snuff takers using a bean in a box of snuff to give it a

pleasant flavor. In medicine it may be employed as an antispasmodic and heart stimulant and is used as a remedy for whooping cough.

A fluid extract is prepared with alcohol, dose 0.30 to 0.50 Cc. (5 to 8 grains).

Coumarin. The chief principle of Tonca beans. A white crystalline substance of strong aromatic odor, soluble in alcohol. This is also obtained from some other plants, and is now almost altogether prepared synthetically. See Part II.

TONGA. Tonga.

A Fiji Island mixture of native drugs of unknown composition. It consists chiefly of thin fibrous barks in long strips wrapped in bundles. It is said to relieve neuralgia, and is used for that purpose mainly.

A fluid extract of the drug is prepared with diluted alcohol as a menstruum, dose 1 to 2 Cc. (15 to 30 minims).

TORMENTILLA. Tormentil.

The rhizome of *Potentilla Tormentilla*, Sibthorp (Fam. Rosaceæ). Native of Europe. This drug is a powerful astringent, containing about 25 percent. of tannin and astringent principles. It is employed in dysentery and relaxed conditions. Dose of the powdered root 1 to 2 gm. (15 to 30 grains).

A fluid extract is prepared with diluted alcohol, dose 1 to 2 Cc. (15 to 30 minims).

TRAGACANTHA. U. S., Br. Tragacanth.

"A gummy exudation from *Astragalus gummifer*, Labillardière; and from other species of *Astragalus* (Fam. Leguminosæ)." <U. S.

"A gummy exudation obtained by making incisions in the stem of *Astragalus gummifer*, Labill.; and some other species of *Astragalus*, Linn." <Br.

Gum Tragacanth, as it is generally known, is obtained from a small tree growing in the mountains of Asia Minor. The best varieties of the gum are in flakes, but inferior qualities are found on the market in roundish pieces. It is used in pharmacy for making powders and emulsions, and in the preparation of troches and tablets, also in toilet preparations for making Bandoline and similar preparations. It is used by shoemakers for making a paste dressing which they apply to their finished work, and it is employed as a paste for sticking labels on glass or porcelain. It consists of about 53 percent. of arabin and 33 percent. of bassorin, with water and other constituents.

TRIFOLIUM PARTENSE. Red Clover Tops.

The flower-heads of *Trifolium partense*, Linné (Fam. Leguminosæ). Cultivated in all temperate countries. Red clover blossoms are alterative, sedative and deobstruent. Useful in scrofula and blood disorders, and are used in compounds with other drugs as a purifier for the blood.

A fluid extract is prepared, dose $\frac{1}{3}$ to 1 Cc. (10 to 15 minims).

TRILLIUM. Beth Root. Birth Root.

The rhizome of *Trillium erectum*, Linné (Fam. Liliaceæ). Native of the U. S. This is an astringent tonic, having acrid taste and is chiefly employed as a remedy for female disorders, to regulate the menstrual functions. It may also be used advantageously for pulmonary affections.

A fluid extract is prepared with alcohol, dose 4 to 8 Cc. (1 to 2 fl.drachms).

Trillin. An Eclectic concentrate representing the active principles of the root. Dose 1 to 3 grains.

TRIOSTEUM. Fever Root. Tinker's Weed.

The root of *Triosteum perfoliatum*, (Fam. Caprifoliaceæ). Native of the U. S. This is a bitter root with a nauseating taste. It is purgative and emmenagogue and is used in fevers and amenorrhœa.

Dose of the powdered root 20 to 40 grains.

TRITICUM. U. S. Triticum. Couch Grass.

"The dried rhizome of *Agropyron repens*, (Linné), Beauvois (Fam. Gramineæ); gathered in the spring." <U. S.

Couch grass is a native of Europe, but is now abundant in meadows and lawns in the northern United States, and causes considerable trouble to exterminate it. In medicine it is used chiefly as an ingredient in species; but a fluid extract is official in the U. S. P., and is used whenever a liquid preparation of the plant is desired. It is given in bladder trouble in doses of one fl.drachm.

Average dose of drug.—8 gm. (120 grains).

TURPETHUM. Turpeth Root.

The root of *Ipomœa turpethum*, (Fam. Convolvulacæ). Native of India. This root has properties and action similar to jalap and yields a resin like jalap, known as turpethin. It is purgative.

Dose of powdered root 5 to 8 grains.

TUSSILAGO. Coltsfoot.

The leaves and the root of *Tussilago farfara*, (Fam. Compositæ). Native of Europe. Its taste is bitter and astringent. It yields mucilage and a bitter principle. It is useful as a tonic and demulcent and is particularly used for chronic pulmonary affections and in scrofula. Coltsfoot rock or Coltsfoot candy is a popular preparation in England for coughs and colds.

A fluid extract is prepared with diluted alcohol, dose 4 to 8 Cc. (1 to 2 fl.drachms).

ULMUS. U. S. Elm. [Slippery Elm].

"The dried inner bark of *Ulmus fulva*, Michaux (Fam. Ulmaceæ); deprived of its periderm." <U. S.

The tree from which the bark is obtained is common throughout the northern and central United States, but the greater part of the commercial supply is gathered in Michigan. It is used chiefly as a demulcent and for its mucilaginous properties. The whole bark is soaked in water, and the mucilaginous liquid used as a cooling demulcent drink for irritation or inflammation of the stomach, intestines or bladder. The ground and powdered bark is used for poultices, the ground bark being preferred, as it does not stick to the surface as does the powdered; the powdered bark is used as a dusting for irritated surfaces, and in making pills or troches; mixed with water it is also used as an enema or injection. Tents are also prepared from elm bark, for dilating fistulas or other canals.

URECHITES SUBERECTA. Savana Flower.

A poisonous plant, native of Jamaica, and having properties like aconite. It is claimed to be very valuable in the treatment of intermittent fevers peculiar to the southern climate, and in yellow fever. It is a powerful drug and must be employed cautiously.

A fluid extract is prepared, dose 2 to 10 minims.

URTICA DIOICA. Nettle.

The root of the herb (Fam. Urticacæ). Native of Europe. This is an astringent and one of the purest and most powerful diuretics in materia-medica. It is useful for dropsy, gravel, kidney diseases and in the summer-complaints of children and bowel affections of adults. The juice of this herb is also useful in hemorrhages.

A fluid extract of the root is prepared, dose 1 to 2 Cc. (15 to 30 minims).

USTILAGO. Corn Ergot. Cornsmut.

A fungus growth found upon *Zea Mays*, *Ustilago Maydis*, Leville (Fam. Fungi). This growth, which is usually found upon the ear of the corn, contains about 5½ percent. of an amorphous red-brown substance resembling the sclerotic acid of ergot. Its uses are similar to ergot, but it has the advantage of increasing the force without increasing the duration of uterine contractions.

Average dose of the powdered drug about 2 gm. (30 grains).

A fluid extract is prepared with diluted alcohol, dose 1 to 5 Cc. (15 to 75 minims).

UVÆ. Uvæ Passæ. Raisins.

The dried ripe fruit of *Vitis vinifera*, Linné (Fam. Ampelidaceæ). Native of western Asia and the Caucasic provinces of Russia, but now cultivated in Europe, U. S. and Australia. The fruit is collected when ripe and dried chiefly in the sunshine. Formerly raisins have been obtained mainly from Spain, Italy and Asia Minor, but now those used in this country are produced in California, the dried muscat, malaga and muscatel grapes of central California being equal in all respects to the imported varieties. They are largely used for table and culinary purposes, and in medicinal confections and compound liqueurs.

UVA URSI. U. S. Uva Ursi.**Uva Ursi Folia. Br. Bearberry Leaves.**

"The dried leaves of *Arctostaphylos Uva-ursi*, (Linné), Sprengel (Fam. Ericaceæ)." <U. S.

"The dried leaves of *Arctostaphylos Uva-ursi*, Spreng." <Br.

This small tree or shrub is found throughout northern Europe, Asia and America, but the commercial supply of the leaves is mostly obtained from Europe.

This is an astringent of considerable power over the urinary organs and bladder, and is used in catarrhal conditions of these organs, and for discharges caused by these conditions. A fluid extract is official, and the leaves are frequently used for making an infusion, and in diuretic teas for the kidneys and bladder.

Average dose of drug.—2 gm. (30 grains).

Arbutin (which has also been called *Ursin*) is a glucoside obtained from *Uva-ursi*. *Ericolin* and *Ursone* have also been isolated.

VACCINUM CRASSIFOLIUM.

The plant, (Fam. Ericaceæ). Native of southern U. S. Properties similar to *Uva ursi*, diuretic and astringent. Useful in vesical catarrh, dysentery etc.

A fluid extract is prepared, dose 2 to 4 Cc. (30 to 60 minims).

VALERIANA. U. S. Valerian.**Valerianæ Rhizoma. Br. Valerian Root.**

"The dried rhizome and roots of *Valeriana officinalis*, Linné (Fam. Valerianaceæ)." <U. S.

"The dried erect rhizome and roots of *Valeriana officinalis*, Linn.; collected in the autumn." <Br.

This herbaceous plant is a native of Europe, growing in damp woods or fields, and also on dry, high levels, the plants grown in different locations having much difference in appearance, and that growing on dry soil being preferred as medicine. It is also cultivated in the United States and our market is now mostly supplied with the root of native growth.

Valerian has long been used as a nerve and is a familiar domestic remedy. A fluid extract, tincture and ammoniated tincture are official in the U. S. Its odor is due to a volatile oil (oil of valerian) which may be obtained by distillation. Its dose is from 4 to 5 drops.

Average dose of the drug.—2 gm. (30 grains).

Valerianic Acid. This is an important constituent of the root, possessing its nervine properties. It is used for preparing several valerianate salts.

Validol. Menthol Valerianate.—This is a compound nerve sedative, carminative and stomachic prepared by combining menthol and a valerianate salt. The dose is 10 to 20 drops on sugar.

Valyl. Valerianic Acid Diamine.—This is a compound sedative and antispasmodic, put up in 2 grain capsules. The dose is 1 to 3 capsules.

VANILLA. U. S. Vanilla.

"The cured full grown, but immature fruit of *Vanilla planifolia*, Andrews (Fam. Orchideæ)." <U. S.

This is a climbing plant, with fleshy dark-green, perennial stem and dark-green, tough leaves. The fruit is a long slim pod containing an innumerable number of very small seeds and an oily pulp. The fruit is the part used as a flavoring; an extract or tincture being prepared from it which is very popular for flavoring pastry and ice cream, and for syrup used at the soda fountain; also in many medicines and perfumes. The Mexican vanilla bean is considered the best. The formulas for extracts will be found under Flavoring Extracts.

Tincture of Vanilla (1:10) is official in the U. S. Used chiefly for flavoring.

Vanillin. $C_8H_8O_3$. This is the odorous crystalline principle of vanilla and is chemically Methyl-protocatechuic aldehyde. It is also artificially prepared from the sap-wood or juice of pine trees and from many other substances by complex processes. It is prepared and extensively sold for making extract of vanilla, but the flavor of the product lacks the richness and delicacy of the true extract made from vanilla. It is also used in making perfumes etc.

One ounce of vanillin and $\frac{1}{4}$ ounce coumarin, with $1\frac{1}{2}$ gallons of cologne spirit, $1\frac{1}{4}$ gallons of water, and $\frac{1}{2}$ gallon of syrup, colored with caramel produces a fair imitation of vanilla extract.

VERATRUM. U. S. American Hellebore.

"The dried rhizome and roots of *Veratrum viride*, Aiton (American Hellebore), or *Veratrum album*, Linné (White Hellebore)." (Fam. Liliaceæ)." <U. S.

This plant grows in wet ground and swamps throughout the northern and middle United States. A tincture is made from the fresh root and a fluid extract and tincture are prepared from the dry root. It reduces the force of the arterial circulation and is given in fevers, pneumonia etc., as an arterial sedative. The dose of the fluid extract is from 1 to 3 drops.

Average dose of the powdered drug.—0.125 gm.=125 milligrammes, 2 grains).

A number of alkaloidal principles have been isolated from veratrum, among which may be mentioned jervine, pseudojervine, veratroidine and protoveratrine, as most important; they are, however, seldom employed in medicine. Norwood's Tincture of *Veratrum Viride* is considered the most reliable preparation. This is made from the fresh root. It is highly esteemed in Eclectic practice.

Veratrine. This is the principal alkaloid of veratrum and is official in the U. S. P. See Part II. Several salts of this alkaloid are prepared.

Veratrin. An Eclectic concentrate prepared by precipitating a concentrated extract in the usual manner.

Veratrone. An aqueous fluid extract of *veratrum viride* bearing this title is prepared by P. D. & Co. for hypodermic use. Dose 10 to 20 minims.

VERBASCUM. Mullein.

The leaves and flowers of *Verbascum thapsus* and other species (Fam. Scrophulariaceæ). Native of Europe and North America. A tall, woolly plant common in roadsides and pastures. The flowers are used in the form of infusion as a demulcent and diuretic for catarrhs, colds and dysentery. The dried leaves are smoked for asthma and catarrh.

A fluid extract it prepared from the leaves or the root, dose 2 to 8 Cc. ($\frac{1}{2}$ to 2 fl.drachms).

VERBENA. Nettle-leaved Verbena.

The root of *Verbena Urticifolia* (Fam. Verbenaceæ). Native of U. S. It is antiperiodic and alterative. Useful in various forms of fever and malaria.

A fluid extract is prepared, dose 2 to 3 Cc. (30 to 45 minims).

Verbenin. An Eclectic concentrate prepared from verbena root above named. Dose 2 to 5 grains.

VERONICA. Speedwell.

The herb, *Veronica officinalis*. Native of Europe. This has an astringent, bitterish taste. It is alterative, diuretic and expectorant. Useful in catarrh

of the bladder and in influenzas, preferably given in the form of infusion—one ounce in a pint of hot water.

Taken hot it is said that it will break up an influenza cold.

VERVAIN. Blue Vervain. Wild Hyssop.

The roots of *Verbena hastata* (Fam. Verbenaceæ). Native of U. S. This is expectorant, tonic and sudorific. Best used in the form of hot infusion for fevers and influenza.

A fluid extract is prepared, dose 2 to 4 Cc. (30 to 60 minims).

VETTIVERIA. Vetivert. Cuscut.

The fibrous roots of *Andropogon Muricatus*, Retz (Fam. Graminaceæ). Native of East India. This root has a persistent, fragrant odor and contains volatile oil and resin. It is used chiefly in perfumery, especially in sachet-bags and rose-jars.

VIBURNUM OPULUS. U. S. [Cramp Bark].

High Bush Cranberry. Cranberry Tree.

"The dried bark of *Viburnum Opulus*, Linné (Fam. Caprifoliaceæ)." <U. S.

This bush grows in low grounds in the northern and central United States. The bark is employed by Eclectic physicians as a tonic, especially for the uterine organs. A fluid extract is official in the U. S. P.

Average dose of drug.—2 gm. (30 grains).

Viburnin. This is a resinoid obtained by precipitating a concentrated extract of the bark. It is employed for the same purpose as the bark and represents its properties in a concentrated form.

VIBURNUM PRUNIFOLIUM. U. S. [Black Haw].

Sloe. Stagbush.

"The dried bark of the root of *Viburnum prunifolium*, Linné; or of *Viburnum Lentago*, Linné (Fam. Caprifoliaceæ)." <U. S.

This is a tall shrub common in the middle and southern United States, east of the Mississippi river. The bark is employed in the treatment of uterine diseases, as a tonic and to prevent miscarriage and dismenorrhœa. A fluid extract of the bark is official, and is used in several compounds prepared for uterine troubles.

Average dose.—2 gm. (30 grains).

VIOLA. Violet.

Several species of Violet are used in medicine. The root of Bird-foot violet (*V. pedata*); common field violet of U. S., contains a yellow, bitter principle, violin. The root is astringent, refrigerant and laxative. Useful in pulmonary affections, dysentery and blood disorders.

A syrup is prepared by steeping the fresh flowers in a solution of sugar. Dose 4 to 8 Cc. (1 to 2 fl.drachms).

Viola Tricolor. Wild Pansy. Heart's-ease. This plant is inodorous and has a bitter, acrid taste. The leaves only are used. They are diuretic, alterative, expectorant and laxative. Useful in bronchial affections, and especially in eczemas, both internally and externally.

A fluid extract is prepared, dose 2 to 8 Cc. ($\frac{1}{2}$ to 2 fl.drachms).

VITELLUS. Yolk of Egg.

The central, yellow part of the hen's egg (Fam. *Gallus Bankiva*, var. *Domesticus*). The yolk of eggs is used in medicine for making certain emulsions and nutritive drinks. A glycerite called glyconin was official in the 1880 U. S. P. but was dismissed in the 8th revision.

WINTERA. Winteræ Cortex. Winter's Bark.

The inner bark of *Drimys Winteri*, Forster (Fam. Magnoliaceæ). Native of South America. This is an evergreen tree yielding a volatile oil, resin, tannic

acid and iron oxide. Its odor is aromatic; taste spicy, pungent and astringent. It is quite similar to canella and cinnamon, and is used as a stimulant and aromatic tonic.

A fluid extract is prepared with alcohol, dose 1 to 2 Cc. (15 to 30 minims).

XANTHIUM. Cocklebur.

The leaves of *Xanthium Strumarium*, (Fam. Compositæ). Native of U. S. Commonly called clotweed. It is chiefly styptic and is employed as an antidote in bites of poisonous insects, also as an application in purpura hemorrhagica.

A fluid extract is prepared, dose 4 to 8 Cc. (1 to 2 fl.drachms).

XANTHIUM SPINOSUM. Spiny Burr-weed or Cocklebur.

The herb (Fam. Compositæ). Native of Europe and U. S. This plant has the reputation of curing hydrophobia. The bruised herb is applied to the bitten part and is said to neutralize the poison of rabies.

A fluid extract is prepared, dose 10 to 20 minims.

XANTHORRHIZA. Yellow Root.

The rhizome and root of *Xanthorrhiza*, (Fam. Ranunculaceæ). Native of northeastern U. S. A shrub 12 to 14 inches high, having a yellow root with bitter taste and containing berberine. It is a bitter tonic similar in action and properties to columbo and quassia. A yellow dye is made from its root by boiling it in water.

A fluid extract is prepared, dose 4 to 8 Cc. (1 to 2 fl.drachms).

XANTHOXYLUM. U. S. Prickly Ash.

"The dried bark of *Xanthoxylum americanum*, Miller (Northern Prickly Ash), or of *Fagara Clava-Herculis*, (Linné); (Southern Prickly Ash) (Fam. Rutaceæ)." <U. S.

Northern prickly ash is found in moist woods throughout the northern and central United States. It is used in medicine as a stimulant to the circulation and for rheumatism, also externally in the form of an alcoholic tincture, as a counter irritant. A fluid extract is official in the U. S. P., the dose being 10 minims.

Average dose of drug.—2 gm. (30 grains).

Xanthoxylin. A resinoid is prepared by precipitating an alcoholic extract of the bark in the usual manner. Its uses and properties are the same as the bark, the dose being $\frac{1}{4}$ to 1 grain.

YOHIMBE.

The bark of *Coryanthe yohimbe* (Fam. Rubiaceæ), indigenous to the Cameroons. It is said to be an aphrodisiac, more powerful than damiana. A fluid extract may be prepared with diluted alcohol.

Yohimbine hydrochloride. $C_{22}H_{35}O_3N_2 \cdot HCl$. The salt of an alkaloid obtained from yohimbe bark. A white crystalline powder, moderately soluble in alcohol and water. Dose $\frac{1}{12}$ grain in tablets or hypodermically.

Yohimbetol. An alkaloidal preparation for veterinary use. A horse aphrodisiac.

ZEAL. U. S. Corn Silk.

"The fresh styles and stigmas of *Zea Mays*, Linné (Fam. Gramineæ)." <U. S.

Corn silk is used as diuretic and for kidney and bladder troubles. A fluid extract of the fresh drug is preferred, but a fluid extract is also prepared from the dry.

Maizenic Acid has been obtained from it and is used for similar purposes as the drug; the dose being $\frac{1}{8}$ grain.

ZEDOARIA. Zedoary.

The root of *Curcuma Zedoaria*. Native of the East Indies. It has an aromatic odor and a pungent, bitter, camphoraceous taste. It yields a volatile

oil, a soft resin and a bitter extract. It is stimulating and has properties and action similar to ginger.

A fluid extract is prepared with alcohol, dose $\frac{2}{3}$ to 2 Cc. (10 to 30 minims).

ZINGIBER. U. S., Br. Ginger.

"The dried rhizome of *Zingiber officinale*, Roscoe (Fam. Zingiberaceæ)." < U. S.

"The scraped and dried rhizome of *Zingiber officinale*, Roscoe." < Br.

Ginger root is obtained chiefly from the East and West Indies and Africa. The Jamaica Ginger of the West Indies has the finest flavor, but less strength than some of the other varieties. The fresh ginger root is preserved by boiling it in syrup, the dried root is used as an ingredient in pickles and relishes, but the ground and powdered root is more generally used in medicine. An oil of ginger is obtained by distilling the fresh root; an oleo-resin, a fluid extract and tinctures are official, and an extract or "essence" is used for flavoring and as a household remedy.

Ginger is an aromatic stimulant and carminative, used in dyspepsia, flatulence, colic and diarrhœas. Ginger tea is a warm infusion of the root which is frequently given for sudden colds etc., and to relieve congestion. Ground ginger is also used as an application in the form of a poultice. Altogether it is one of the most used and useful remedies of the materia medica.

Average dose of powder.—1 gm. (15 grains).

CHEMICAL ELEMENTS

All material substances, of whatever nature, are composed or made up of what are called **chemical elements**. A chemical element is a primary substance that cannot, by any known means, be divided or separated into any other substance. It consists of the same kind of matter throughout. Thus oxygen, hydrogen, nitrogen, copper, mercury, iron etc., have been proven to be elements because they cannot be resolved into anything else. All material things are made up of these chemical elements, which may be associated or compounded with other elements in infinite variety, but still retain their individuality, and may be separated from their union or recombined with other elements at the will of the intelligent chemist.

About eighty such substances have been discovered by chemists, and assigned their places in the family of chemical elements. In this section they are briefly described, together with their more important compounds. Many of them are used in medicine and are more fully described in Part II.

Chemical elements and their many combinations furnish a considerable part of the materials now used in medicine and pharmacy. The definite chemical combinations, in the form of elements, and their salts produced by the union of bases and acids; the alkaloids and their salts; the glucosides and other principles derived from organic substances, together with the chemical productions of modern materia medica make up the greater part of the preparations used as medicine at the present time; and the production of these preparations is chiefly due to the study and understanding of the science of chemistry.

CHEMISTRY

The branch of physical science that treats of the composition of matter, and the properties and relations of the elements composing it is called **Chemistry**.

The present science of chemistry cannot be said to have had a history until the last quarter of the Eighteenth Century. Before this, the alchemists occupied the field, working upon individual lines and without system, ignorant of the principles of chemistry and the composition of matter. Nevertheless their efforts to transmute the baser metals into gold and to discover a universal solvent or alkahest, paved the way for the science of chemistry as it is known and taught at the present time.

The discovery of the various elements, which compose all forms of matter, is duly noticed under the names of the elements in the following pages, and, aside from the theories which have been prevalent at various times, (which are now mostly obsolete), there is but little other early history to record.

All material substances, of whatever kind or nature, are composed of **molecules** which are themselves made up of **atoms** of what were supposed to be primary substances called **elements**. When a substance can no longer be divided into any other substance, but consists only of the same kind of matter throughout, it is termed an element. Thus copper, mercury and oxygen are called elements because they cannot by any known means be separated into any other substances.

Nomenclature.

In chemistry a reformation in nomenclature was instituted under the direction of the French Academy of Sciences in 1787, and was ably forwarded by Morveau, Lavoisier, Berthollet and Fourcroy to whose work entitled "*Methode de Nomenclature Chimique*," published in that year we owe much of the system which now prevails.

Many of the chemical elements have been named by their discoverers from some characteristic or quality which they possess; as chlorine (green), referring to its color; bromine (stench), referring to its odor; lithium from lithos (stone); magnesium (a district in Thessaly where it is obtained); strontium (a town in Scotland); thorium (the God Thor); nitrogen (nitre forming); oxygen (acid forming); iridium (a rain-bow); manganese (magnet); phosphorus (light bearing); hydrogen (water forming); barium, from barys (heavy); radium, from its property of emitting rays; iodine, from Gr. iodes (violet). Several elements are named from the locality where they are obtained and others from the name of their discoverer.

Most chemical combinations bear the name of the element or radical together with the acid with which they are combined but many of the late compounds have names given them corresponding to some characteristic or quality which they have or are reputed to possess.

The names of chemicals are generally given in this work in the Latin and English, also; many of them, in the foreign pharmaceutical names which they have in various countries.

Chemical combinations are considered in this work under the name of the element, base or alkaloid from which they are derived, and many of the alkaloids and principles, not official, under the name of the drug from which they are obtained. The official acids are mostly included under the heading *Acida*, but many unofficial acids are mentioned under the name of drugs or substances from which they are obtained.

Atomic Weight.

Recent discoveries go to show that atoms are not (as has been supposed), the ultimate particles of matter, but are shells filled with electrons that are (as far as has yet been determined) the elementary entities. Atoms, however, are the combining units, and all chemical science is based upon their identity and combining value.

The weight of an atom is its combining weight as compared with hydrogen which is the lightest known element and the weight of which is assumed as 1, or of oxygen as 16, which is taken as a standard by some authorities.

As the weight of hydrogen is not an exact proportion of 1 to 16 for the same volume under the same conditions, there is a slight difference in the atomic weights of elements corresponding to the standard taken. If hydrogen is taken as 1, oxygen is 15.88; and if oxygen is taken as 16, hydrogen is 1.008. The U. S. P., the Br. P., and many other authoritative works adopt hydrogen as 1, the standard of atomic weight; but most of the recent chemical authorities and the recently published European pharmacopœias adopt oxygen as 16, the standard of atomic weight. This should be well understood when making calculations of the atomic weight of compounds.

Molecular Weight.

The molecular weight of a chemical compound is the combined weight of the atoms that compose it. In calculating the molecular weight of a compound add together the atomic weights of the elements of which it is composed in the proportions in which they occur in the molecule. The sum is the molecular weight of the compound.

In the following table the names of the Elements, the Symbols by which they are known, and their Atomic Weights, based upon O=16 as the standard, conform to the determinations of the International Committee on Atomic Weights of 1911. The Atomic Weights based upon H=1 as the standard are also given for convenient reference and comparison, as the U. S. P. and Br. P. and many chemical text books give the atomic weight compared with hydrogen as 1.

The atomic weight of any element, or the molecular weight of any substance, given with H=1 as a basis, may readily be converted into weights with O=16 as a basis by multiplying the given weight by 1.008.

TABLE OF ATOMIC WEIGHTS

Adopted by the International Committee on Atomic Weights, 1911.

		H=1	O=16			H=1	O=16
Aluminum.....	Al	26.9	27.1	Molybdenum.....	Mo	95.3	96.0
Antimony.....	Sb	119.2	120.2	Neodymium.....	Nd	142.5	144.3
Argon.....	A	39.6	39.88	Neon.....	Ne	20.	20.2
Arsenic.....	As	74.37	74.96	Nickel.....	Ni	58.2	58.68
Barium.....	Ba	136.3	137.37	Nitrogen.....	N	13.9	14.01
Bismuth.....	Bi	206.3	208.0	Osmium.....	Os	189.4	190.9
Boron.....	B	10.9	11.0	Oxygen.....	O	15.88	16.00
Bromine.....	Br	79.29	79.92	Palladium.....	Pd	105.9	106.7
Cadmium.....	Cd	111.5	112.40	Phosphorus.....	P	30.8	31.04
Cæsium.....	Cs	131.7	132.81	Platinum.....	Pt	193.6	195.2
Calcium.....	Ca	39.8	40.09	Potassium.....	K	38.85	39.10
Carbon.....	C	11.9	12.00	Praseodymium...	Pr	139.4	140.6
Cerium.....	Ce	139.1	140.25	Radium.....	Ra	224.6	226.4
Chlorine.....	Cl	35.18	35.46	Rhodium.....	Rh	102.	102.9
Chromium.....	Cr	51.58	52.0	Rubidium.....	Rb	84.8	85.45
Cobalt.....	Co	58.5	58.97	Ruthenium.....	Ru	100.9	101.7
Columbium*....	Cb	92.8	93.5	Samarium.....	Sa	148.9	150.4
Copper.....	Cu	63.1	63.57	Scandium.....	Sc	43.8	44.1
Dysprosium.....	Dy	161.2	162.5	Selenium.....	Se	78.6	79.2
Erbium.....	Er	166.1	167.4	Silicon.....	Si	28.1	28.3
Europium.....	Eu	150.8	152.0	Silver.....	Ag	107.02	107.88
Fluorine.....	F	18.8	19.0	Sodium.....	Na	22.82	23.00
Gadolinium.....	Gd	156.	157.3	Strontium.....	Sr	86.93	87.63
Gallium.....	Ga	69.74	69.9	Sulphur.....	S	31.81	32.07
Germanium.....	Ge	71.9	72.5	Tantalum.....	Ta	179.6	181.0
Glucinum†.....	Gl	9.03	9.1	Tellurium.....	Te	126.6	127.5
Gold.....	Au	195.6	197.2	Terbium.....	Tb	157.9	159.2
Helium.....	He	3.96	3.99	Thallium.....	Tl	202.4	204.0
Hydrogen.....	H	1.0	1.008	Thorium.....	Th	230.2	232.0
Indium.....	In	113.9	114.8	Thulium.....	Tm	167.2	168.5
Iodine.....	I	124.9	126.92	Tin.....	Sn	118.0	119.0
Iridium.....	Ir	191.6	193.1	Titanium.....	Ti	47.7	48.1
Iron.....	Fe	55.4	55.85	Tungsten.....	W	182.5	184.0
Krypton.....	Kr	82.2	82.9	Uranium.....	U	236.6	238.5
Lanthanum.....	La	137.9	139.0	Vanadium.....	V	50.6	51.06
Lead.....	Pb	205.5	207.10	Xenon.....	Xe	129.2	130.2
Lithium.....	Li	6.89	6.94	Ytterbium (Neo)	Yb	170.6	172.0
Lutecium.....	Lu	172.6	174.0	Yttrium.....	Y	88.3	89.0
Magnesium.....	Mg	24.13	24.32	Zinc.....	Zn	64.8	65.37
Manganese.....	Mn	54.5	54.93	Zirconium.....	Zr	89.9	90.6
Mercury.....	Hg	198.5	200.0				

*Also called Niobium, Nb=93.5.

†Also called Beryllium, Be=9.1.

PERIODIC ARRANGEMENT OF THE ELEMENTS—MENDELEJEFF'S (Revised 1911).

Ser.	Zero Group	Group I — R ₂ O	Group II — RO	Group III — R ₂ O ₃	Group IV RH ₄ RO ₂	Group V. RH ₃ R ₂ O ₃	Group VI RH ₂ RO ₃	Group VII RH R ₂ O ₇	Group VIII — RO ₄
1		Hydrogen H=1.008							
2	Helium He=3.99	Lithium Li=6.94	Glucium Gl=9.1	Boron B=11.0	Carbon C=12.00	Nitrogen N=14.01	Oxygen O=16.00	Fluorine F=19.0	
3	Neon Ne=20.2	Sodium Na=23.00	Magnesium Mg=24.32	Aluminium Al=27.1	Silicon Si=28.3	Phosphorus P=31.04	Sulphur S=32.07	Chlorine Cl=35.46	
4	Argon A=39.88	Potassium K=39.10	Calcium Ca=40.09	Scandium Sc=44.1	Titanium Ti=48.1	Vanadium V=51.06	Chromium Cr=52.0	Manganese Mn=54.93	Iron Fe=55.85 Cobalt Co=58.97 Nickel Ni=58.68
5		Copper Cu=63.57	Zinc Zn=65.37	Gallium Ga=69.9	Germanium Ge=72.5	Arsenic As=74.96	Selenium Se=79.2	Bromine Br=79.92	
6	Krypton Kr=82.9	Rubidium Rb=85.45	Strontium Sr=87.63	Yttrium Y=89.0	Zirconium Zr=90.6	Columbium Cb=93.5	Mol'denum Mo=96.0		Ruthenium Ru=101.7 Rhodium Rh=102.9 Palladium Pd=106.7
7		Silver Ag=107.88	Cadmium Cd=112.40	Indium In=114.8	Tin Sn=119.0	Antimony Sb=120.2	Tellurium Te=127.5	Iodine I=126.92	
8	Xenon Xe=130.2	Cæsium Cs=132.81	Barium Ba=137.37	Lanthanum La=139.0	Cerium Ce=140.25	Pr'dymium Pr=140.6	Neodymium Nd=144.3		
9		Samarium Sa=150.4		Gadolinium Gd=157.3	Terbium Tb=159.2		Erbium Er=167.4		
10		Thulium Tm=168.5		Ytterbium Yb=172.0		Tantalum Ta=181.0	Tungsten W=184.0		Osmium Os=190.9 Iridium Ir=193.1 Platinum Pt=195.2
11		Gold Au=197.2	Mercury Hg=200.0	Thallium Tl=204.0	Lead Pb=207.10	Bismuth Bi=208.0			
12			Radium Ra=226.4		Thorium Th=232.0		Uranium U=238.5		

THE PERIODIC SYSTEM.

The "Periodic System" which is, also, in its modified form, called the "Natural System of Classification in Chemistry," was formulated by the Russian chemist Mendelejeff, and is based upon the atomic weights of the elements and their periodic occurrence in certain relations.

In the last century many attempts were made by chemists to arrange the elements into groups and series in such a way as to show the relation between their combining weights and properties. Doebereiner in 1817 called attention to a simple relation of kindred elements and in 1829 he showed that there are different groups, of three elements each, which have a constant difference in atomic weights and great similarity of properties, but in different degrees. Newlands in 1865 presented a law of octaves showing that if the elements are arranged in the order of their atomic weight, after an interval of seven an element follows having properties analogous to the first; that is, the 1st, 8th and 15th are similar. But in 1869 Mendelejeff, a Russian, and Lothar Meyer, a German chemist, almost at the same time, reached conclusions from which the Periodic System of the Elements, now generally adopted, was formulated. This system is shown in the table on the opposite page. While it is not, in all respects perfect, it is the best systematic arrangement of the elements that has been proposed, and has done much to explain the relations of elements, one with another, as a whole.

It will be observed that, in a general way, the atomic weights of the elements increase from the left to the right in the horizontal series columns, and from the top to the bottom in the vertical group columns. The elements having like properties and characteristics are in the group columns and they are, more or less related to the neighboring elements on either side, to the right and the left.

Hydrogen, which is the element of least weight seems to have no proper place in the table. Its relative weight would assign it to the top of the zero column, but its properties are very different from the elements in this group, as they do not combine with any other while hydrogen is one of the most active of the elements. Most authorities now place hydrogen at the head of group 1, but, although it has basic characteristics like the elements in this group, its molecule consists of two atoms, while the others of the group have only one, and in liquid and solid forms it exhibits no metallic characteristics, which are very prominent in the elements of this group. For these reasons it corresponds better with the halogens, their molecule consisting of two atoms; and some of the chemical authorities now place hydrogen at the head of Group VII.

Zero Group. This group includes the elements that form no chemical compounds—helium, neon, argon, krypton, xenon. All of these elements are found, in small proportions, in the atmosphere.

Group I. This group is made up of the alkali metals and those metals that have chemical properties like silver. The molecules of the elements in this group consist of but one atom (univalent). It is naturally divided into two subdivisions corresponding with the properties of the elements.

Sub-group A.—Li, K, Rb, Ca.

Sub-group B.—Na, Cu, Ag, Au.

While all of these elements have similar properties in general, the two sub-groups show special similarity in properties.

Group II. This group contains the alkaline-earth metals and those of the zinc group, which are similar in many respects. The elements of this group are bivalent.

Sub-group A.—Be, Ca, Sr, Ba, Ra.

Sub-group B.—Mg, Zn, Cd, Hg.

Group III. This group, which is commonly known as the aluminum group, contains the earth metals. The elements of this group are trivalent.

Sub-group A.—B, Sc, Yt, La.

Sub-group B.—Al, Ga, In, Tl.

Group IV. This is commonly known as the carbon group, and contains elements having properties and characteristics similar to carbon.

Sub-group A.—C, Ti, Zr, Ce, Th.

Sub-group B.—Si, Ge, Sn, Te, Pb.

Group V. This is the nitrogen group in which is included phosphorus, arsenic and bismuth. Up to this group the elements have been mostly metallic but here the not-metals become more prominent, gradually increasing in metallic characteristics with their increase of atomic weight.

Sub-group A.—N, V, Nb, Ta.

Sub-group B.—P, As, Sb, Bi.

Group VI. In this group appear the very important elements oxygen and sulphur heading the sub-groups.

Sub-group A.—O, Cr, Mo, Nd, W, U.

Sub-group B.—S, Se, Te.

Group VII. The halogen group. The halogens fluorine, chlorine, bromine and iodine are entirely not-metals and are placed on the opposite end of the table from the alkali metals. Their simple compounds with the metals have the termination *-ides*.

Manganese occupies an isolated position in the periodic system. It is placed in this group because of its neighborly relation to iron, and it is only in its state of oxidation, permanganic acid, that it is analogous to the corresponding chlorine compound HClO_4 , of the halogen group.

Group VIII. This group contains the metals that do not fit very well into the system, but have neighborly relation to some other elements that have preceded them in the series in which they are placed. This group begins with iron and ends with platinum.

The foregoing explanation of the periodic table relates mainly to the arrangement of the elements and their relation to each other; as shown by this arrangement. There is much besides this, that goes to make up the value of this table that cannot be considered here, but is explained in technical works on chemistry to which our readers are referred.

COMPOSITION OF THE EARTH.

	Solid Crust Percent	Ocean Percent	Atmosphere Percent	Total Percent
Oxygen.....	47.29	85.79	22.00	49.98
Silicon.....	27.21	—	—	25.30
Aluminum.....	7.81	—	—	7.26
Iron.....	5.46	—	—	5.08
Calcium.....	3.77	0.05	—	3.51
Magnesium.....	2.68	0.14	—	2.50
Sodium.....	2.36	1.14	—	2.28
Potassium.....	2.40	0.04	—	2.23
Hydrogen.....	0.21	10.67	—	0.94
Nitrogen.....	—	—	76.60	0.02
Chlorine.....	0.01	2.07	—	0.15
Bromine.....	—	0.008	—	—
Titanium.....	0.33	—	—	0.30
Carbon.....	0.22	0.002	—	0.21
Argon, etc.....	—	—	0.8	—
Phosphorus.....	0.10	—	—	0.09
Manganese.....	0.08	—	—	0.07
Sulphur.....	0.03	0.09	—	0.04
Barium.....	0.03	—	—	0.03
Chromium.....	0.01	—	—	0.01
	100.00	100.00	100.00	100.00

MINERALS.

In the broadest sense minerals comprise all inorganic substances—everything that is neither animal nor vegetable. Minerals may be gaseous, liquid or viscid, but are mostly solid under ordinary conditions. Water is a mineral that may assume a gaseous, liquid or solid state; the bones are mineral, although they are found in animals and are produced by vital processes. Vegetables contain mineral substances found in their ashes after being burned. In a general sense, however, minerals are understood to comprise all manner of rocks, ores, earths and fossils, all solid elementary substances and their salts and all simple and combined inorganic substances.

Nearly every mineral known, is in some form, used in pharmacy or the allied arts. Minerals and mineral salts were among the first substances employed as medicine. The science of chemistry owes its early advancement to the researches of the alchemists and apothecaries in mineral substances, and the legends of medicine and pharmacy are mainly based upon the wonderful curative powers and qualities attributed to minerals.

The collection of native mineral substances does not come within the province of pharmacy, and at present but few mineral salts are prepared by pharmacists, that task—which was, formerly, a necessary part of the business and education of the apothecary—now being given over to the manufacturing chemists, who have better facilities for making them.

Metals.—In a general sense, a metal is an opaque body, usually having a metallic lustre and being, generally, a good conductor of heat and electricity. It may be composed of a single elementary substance as iron, silver, gold, tin or copper, or of two or more metals combined; as type-metal, which is composed of lead, antimony and tin; Babbitt-metal, which is composed of tin, copper and antimony; and brass, which is a combination of tin, copper, zinc and other metals. In chemistry a metal is an "element capable of forming a base, by its combination with oxygen, and a salt by its combination with a salt radical." To illustrate, hydrogen is

a metal because it unites with oxygen, forming a base, hydroxyl (OH). Iron, copper, tin, lead, etc. are metals forming bases (oxides) with oxygen; sodium, potassium and ammonium are metals because they form salts with salt radicals, as chlorine, bromine, iodine, etc. To the ancients, seven metals were known: Gold, silver, copper, lead, iron, mercury and tin. Antimony was discovered in the fifteenth century; bismuth and zinc in the sixteenth; arsenic, chromium, cobalt, manganese, molybdenum, nickel, platinum, tellurium, tungsten and uranium in the eighteenth; and all the remaining metals in the nineteenth century.

The following is a list of recognized metals, although some of them have not yet been isolated, being known only by their spectrum or by salts from which they cannot readily be separated.

Metals.

Aluminum	Molybdenum
Antimony	Nickel
Arsenic	Niobium
Barium	Osmium
Beryllium	Palladium
Bismuth	Platinum
Cadmium	Potassium
Cæsium	Radium
Calcium	Rhodium
Cerium	Rubidium
Chromium	Ruthenium
Cobalt	Samarium
Columbium,	Scandium
(Niobium)	Silver
Copper	Sodium
Didymium	Strontium
Erbium	Tantalum
Gallium	Terbium
Germanium	Thallium
Gold	Thorium
Indium	Thulium
Iridium	Tin
Iron	Titanium
Lanthanum	Tungsten
Lead	Uranium
Lithium	Vanadium
Lutecium	Ytterbium
Magnesium	Yttrium
Manganese	Zinc
Mercury	Zirconium

Not-Metals.—Also called "non-metals" and by some authors "metalloids."

When a compound of a metal with a not-metal is decomposed by elect-

rolysis, the metal is disengaged at the negative pole of the battery, while the not-metal is disengaged at the positive pole. For this reason the metals (being attracted by a substance of an opposed electrical state) are called "positive" and the not-metals are called "negative." There are also other characteristics by which they may be known which will be considered elsewhere. A considerable number of the elements have both metal and not-metal characteristics, (as arsenic, tellurium, etc.), and the line of difference between them is not very sharply marked, so that under proper conditions, they may be either metal or not-metal. The following are the elementary substances recognized as not-metals:

Not-Metals.

Boron	Nitrogen
Bromine	Oxygen
Carbon	Phosphorus
Chlorine	Selenium
Fluorine	Silicon
Hydrogen	Sulphur
Iodine	Tellurium

Arsenic seems to have both metal and not-metal characteristics, and antimony, although more metallic than arsenic, presents not-metal characteristics in some of its compounds.

The Zero Group.

Argon, Helium, Krypton, Neon and Xenon are not known to combine with any elements and cannot, therefore, be classed either as metals or not-metals.

Inorganic Chemical Compounds.

The process by which substances unite to form other substances or compounds is called *chemical action*, or *chemicism*, and the force with which they so unite is called *chemical attraction* or *affinity*; mineral chemical substances are called *inorganic*; vegetable chemical substances are called *organic*.

Inorganic chemical compounds are produced by the union of mineral bases with acids, and the salts thus composed constitute a large share of the chemicals of pharmacy and commerce. The salts thus formed bearing the names both of the base and the acid of which they are composed; for examples, potassium acetate, ferrous

sulphate, sodium phosphate, etc. Elementary substances also unite with each other without the intervention of an acid, as bromine with potassium, forming potassium bromide; mercury with iodine, forming mercurous iodide, etc.

The names of chemical salts are distinguished by certain prefixes or terminations, which indicate, in a manner, the proportions of the combinations. These are shown and explained in the abbreviations, etc., in the first part of this work.

Densities of Metals.

Aluminum	2.6
Antimony	6.6
Arsenic	5.7
Barium	3.7
Bismuth	9.8
Cadmium	8.6
Cæsium	1.9
Calcium	1.6
Chromium	6.5
Cobalt	8.6
Copper	8.9
Gold	19.3
Iron	(average) 7.8
Lead	11.4
Lithium	0.58
Magnesium	1.7
Manganese	7.4
Mercury	13.6
Molybdenum	8.6
Nickel	8.9
Platinum	21.5
Potassium	0.87
Rubidium	1.5
Silver	10.5
Sodium	0.98
Strontium	2.5
Tellurium	6.2
Thallium	11.8
Tin	7.3
Tungsten	19.1
Vanadium	5.5
Zinc	7.1

Densities of Not-Metals.

Boron	2.5
Carbon	3.
(allotropic forms)	
Iodine	5.0
Phosphorus	1.3
(allotropic forms)	
Sulphur	2.0
(allotropic forms)	
Selenium	4.8
Silicon	2.3

Densities of Gases.

(In Gms. per liter, at 0°C. and 76 cm.).

Ammonia	0.762
Argon	1.782
Bromine	7.143
Carbon monoxide	1.251
Carbon dioxide	1.965
Chlorine	3.167
Fluorine	1.697
Helium	0.179
Hydrogen	0.090
Hydrobromic acid	3.620
Hydrochloric acid	1.628
Hydrofluoric acid	0.894
Hydriodic acid	5.710
Krypton	3.654
Neon	0.893
Oxygen	1.430
Nitrogen	1.254
Water vapor	0.804
Xenon	5.720

Cadmium	775°
Chlorine	33.6°
Copper	2100°
Fluorine	187°
Helium	267°
Hydrogen	253°
Krypton	152°
Magnesium	1100°
Mercury	357°
Nitrogen	194°
Oxygen	182°
Phosphorus	290°
Potassium	700°
Sodium	800°
Sulphur	444°
Tellurium	1400°
Thallium	1700°
Tin	1500°
Xenon	109°
Zinc	925°

Melting Points of the Elements.

	C.°
Aluminum	650°
Antimony	625°
Barium	850°
Bismuth	268°
Cadmium	320°
Cæsium	27°
Calcium	770°
Cobalt	1600°
Copper	1065°
Iron (cast)	(about) 1200°
Iodine	113°
Lead	325°
Lithium	185°
Magnesium	630°
Manganese	1230°
Mercury	40°
Nickel	1500°
Phosphorus	44°
Platinum	1800°
Rubidium	38°
Silver	955°
Sodium	97°
Sulphur	115°
(several allotropic forms with different melting points)	
Strontium (anhydrous)	825°
Tellurium	450°
Thallium	300°
Tin	232°
Zinc	415°

Boiling Points of Elements.

(At 76 cm. pressure). C.°

Argon	186°
Bismuth	1450°
Bromine	63°

Boiling Points of some commonly known compounds.

(At pressure of 1 atmosphere, 76 cm.). C.°

Acetic Acid, glacial	117°
Acetone	56.5°
Alcohol, ethyl, U. S. P.	78°
Alcohol, methyl	65°
Aldehyde	21°
Ammonia, (liquefied gas)	33.5°
Amyl nitrite	96°-99°
Benzin, petroleum	45°-60°
Benzol	80°
Carbon disulphide	46°-47°
Carbon dioxide, (liquefied)	80°
Chloroform	60°-61°
Creosote	200°-220°
Cresol	195°-205°
Ether, U. S. P.	35.5°
Ether, acetic	72°
Ethyl chloride	13°
Eucalyptol	176°-177°
Glycerin, (anhydrous)	290°
Guaiacol, (liquid)	200°
Hydrobromic acid, (liquefied gas)	73°
Hydrochloric acid, (liquefied gas)	80°
Hydrogen sulphide, (liquefied gas)	62°
Methyl salicylate	220°
Nitrous oxide, (liquefied gas)	92°
Oil of turpentine	157°
Phenol	188°
Sulphur dioxide, (liquefied gas)	8°
Sulphur trioxide	46°
Sulphuric acid, C. P.	338°
Water, distilled	100°

AIR—THE ATMOSPHERE.

Although air is not an element, in the chemical sense of the term, it is a medium in which most chemical processes occur and is essential to all forms of life. Physicists tell us that it is an elastic gaseous envelope surrounding the earth and extending to a height variously estimated at from 45 to 200 miles, gradually diminishing in density as it extends upwards, but held in bounds by the earth's attraction and revolving with it in its daily revolution on its axis.

It has been determined by many scientific experiments and calculations that the weight of the atmosphere at sea-level is equal to 14.6 avoirdupois pounds per square inch.

Barometry is that branch of science which relates to the measurement of atmospheric weight or pressure, by means of instruments called Barometers.

Early History of Barometers.

Torricelli, a pupil of Galileo, in 1643 had his attention called to a deep well near Florence, from which they had attempted, ineffectually, to raise water by a suction pump. He found that water could not be made to rise in the pump higher than about 32 feet, and, upon reflection, concluded that the weight or pressure of air caused the water to rise and that the pressure was only sufficient to raise it in a vacuum to the height of 32 feet; that is, that the weight or pressure of the air would counterbalance a column of water only about 32 feet in height.

Reasoning from these premises he concluded that a liquid heavier than water would be counterbalanced in a vacuum tube at a height corresponding to its relative weight. As quicksilver was the heaviest known liquid he chose that for his experiments. Taking a glass tube about four feet long and one-fourth inch in diameter, he sealed it at one end and filled it with mercury, then inverted it into a vessel containing mercury. The mercury in the tube immediately sank to the height of about 30 inches, where it remained stationary, showing that the weight of the atmosphere counterbalanced the weight of a column of mercury 30 inches high in the tube. Later he bent up the lower end of the tube, thus forming a siphon which retained the mercury in the tube, doing away with the vessel which formed a reservoir for the mercury. It was then only necessary to graduate the tube of the instrument or to put it into a frame in which a scale was arranged to show the changes of pressure of the atmosphere.

The two forms of mercury barometers now commonly used are the **cistern barometer**, as first described, and the **siphon barometer** made by bending up the lower end of the tube as above mentioned. Many forms of mercury barometers have been constructed but they are all similar in principle and action to those originally invented by Torricelli.

Aneroid barometer. This is an instrument in which no liquid is used, but which is arranged with a cylindrical metal box, from which the air is exhausted, and, having a thin metallic cover, is sensitive to atmospheric pressure, which is transmitted by means of multiplying levers to pointers that show on a dial the degrees of pressure; indicating rain, stormy, or fair weather. This apparatus, being portable, is very convenient, especially for estimating the height of hills and mountains by pressure of the atmosphere.

Manometer. An instrument constructed for measuring the tension of gases or vapors. This is constructed like a mercury barometer, having an open end at the top and a bent up tube and reservoir at the bottom, connected with a tube which admits the gas or vapor to be tested. The gas or vapor pressing upon the mercury in the closed reservoir forces it up in the vertical tube, which is graduated in units of one atmosphere, thus showing the amount of pressure as compared with atmospheric pressure.

In all barometers and instruments intended for measuring the pressure of gases or vapors the pressure of the atmosphere is taken as the unit. This, at sea-level, is taken as 30 inches, and is nearly 15 pounds to the square inch. And when a pressure of one atmosphere is stated it means a pressure which will sustain a column of mercury 30 inches high which is equal to a pressure of 15 pounds (nearly) to the square inch.

In the ordinary operations of pharmacy and chemistry the barometer is seldom used, but in physics it is a very important instrument and it is invaluable in determining the weight of gases, and in many other exact requirements of chemistry.

Chemical Composition of Air.

Up to the last quarter of the Eighteenth Century no one knew anything about the chemical composition of air. Rutherford discovered nitrogen in 1772 and Priestly oxygen in 1774. These discoveries paved the way for finding the composition of air. Priestly continued his work of investigation and Scheele, a Swedish apothecary, working independently, at about the same time a few years later, announced the discovery of the composition of air as oxygen and nitrogen, in the proportion of about one volume of oxygen to four volumes of nitrogen; carbonic acid and ammonia in very minute proportions were, afterwards, added but it was not until more than a century later that helium, neon, argon, krypton and xenon, were discovered as constituents of the atmosphere.

From a chemical standpoint, oxygen chiefly influences the chemical changes that occur in the presence of air. Nitrogen is inert, serving only to dilute the oxygen; carbonic acid, in its way, has its uses in supporting vegetation, but the rare gases of the atmosphere recently discovered make no combinations with other elements. All the gases that compose the atmosphere are considered under their appropriate headings in the following pages.

One cubic foot of air at ordinary pressure weighs $1\frac{1}{8}$ ounces av. One pound av. of air = 13.333 cubic feet.

Hygrometry is the act or process of determining the quantity of aqueous vapor contained in a given volume of air. In other words the measurement of humidity in the atmosphere. The quantity of moisture in the atmosphere is constantly changing in accordance with metrological conditions.

Hygrometers are instruments designed to indicate the moisture or humidity of the atmosphere.

ALUMINIUM. (Aluminum).

Sym. Al; at. wt. (O=16) 27.1; sp. gr., cast, 2.56; hammered, 2.67; melts at red heat, about $700^{\circ}\text{C}.$, not volatile; color, silver white, does not readily tarnish in air or water; very malleable and ductile, may be hammered into leaf, like gold leaf; rolled into thin sheets or drawn into fine wire; very tough. Not acted upon by most acids except hydrochloric, with which it combines vigorously; is acted upon by alkalis.

In the periodic arrangement of the elements, aluminum is in Group III, Series 3, having characteristics similar to the rare metals scandium, yttrium, lanthanium and ytterbium.

The metal aluminum does not occur in nature uncombined. It was first discovered by Wöhler in 1827. He isolated the metal by heating powdered aluminum chloride with potassium. At the present time the metal is obtained chiefly from Beauxite, $\text{Al}_2\text{O}(\text{OH})_3$, by electrolytic reduction. It is extensively produced in the U. S. at Niagara Falls, where electric power is cheap and abundant.

Aluminum is a constituent of clay and kaolin (China clay) which are principally aluminum silicate; also feldspar, mica etc., contain it in a base. In Greenland a peculiar aluminum combination called cryolite or ice stone, $3\text{NaF}\cdot\text{AlF}_3$, is found and this was at one time extensively employed in the production of aluminum.

Although it is itself a very soft metal, its oxides are very hard; corundum and emery being used as abrasives. Sapphire and the oriental ruby are oxides of aluminum colored by traces of other oxides.

Aluminum metal is much used in the arts for various purposes and for making steam jacketed kettles, kitchen utensils etc. It forms valuable alloys with other metals which are extensively used, especially aluminum bronze which is an alloy of copper with from 5 to 12 percent. of aluminum. It reduces oxides of many of the metals, especially oxide of iron, with vigorous heat, and the reduction, when started, proceeds by itself. A mixture of aluminum powder and iron oxide called "thermit," used for welding, is an example

of such a combination. Ultramarine, which is a beautiful blue pigment is made by heating together a mixture of clay, soda, sulphur and wood charcoal, so enclosed as to avoid contact with air; lapis lazuli is a natural compound of aluminum much used for ornamental work.

Aluminum Salts.

Alumina. Al_2O_3 . This is the only known oxide of aluminum. It is formed by heating aluminum salts or hydroxide of aluminum to a high temperature. It is a white, amorphous powder readily soluble in acids.

Aluminum Amalgam. This may be readily prepared by adding aluminum filings to a solution of $\frac{1}{2}$ percent. corrosive sublimate. It is a neutral reducing agent and acts very energetically, decomposing water at ordinary temperatures, with evolution of hydrogen and formation of aluminum hydroxide.

Aluminum Acetate. $Al_2(C_2H_3O_2)_6$. Made by dissolving aluminum hydrate in acetic acid to saturation, evaporating and crystallizing. It is chiefly used as a mordant for dyeing and calico printing, but is sometimes used in medicine for diarrhoea, and as a preservative for animal tissues, and in the form of injection for gonorrhoea.

Aluminum Acetotartrate. By mixing equal parts by weight of glacial acetic acid and tartaric acid, adding four times their combined weight of

Aluminum Benzoate. This may be prepared by dissolving aluminum hydroxide to saturation in a concentrated solution of benzoic acid, and evaporating by gentle heat to a dry powder.

water, and then aluminum hydroxide to saturation, evaporating the solution to crystallization, collecting and drying the crystals.

Aluminum Borate. May be prepared by dissolving aluminum hydroxide to saturation in a hot concentrated solution of boric acid.

Aluminum Bromide. Al_2Br_6 . By passing vapor of bromine over a heated mixture of alumina and carbon. Sometimes used as an antiseptic.

Aluminum Chloride. $AlCl_3$. This is prepared by the action of chlorine or hydrochloric acid on aluminum. It is very hygroscopic.

An impure solution of aluminum chloride called Chloralum is made by dissolving one part of aluminum hydrate in five parts of commercial hydrochloric acid. It is used for disinfecting.

Aluminum Fluoride. This combination occurs naturally in the mineral cryolite, which is found in large quantities in Greenland.

Aluminum Hydroxide. $Al_2O_3 \cdot nH_2O$. This is deposited when a solution of an aluminum salt is treated with ammonia. It is obtained as a white insoluble powder.

Aluminum Iodide. Al_2I_6 . By heating aluminum and iodine together in closed tubes.

Aluminum Naphthol-Sulphonate. Alumnol. Prepared by the interaction of naphthol-sulphonate with aluminum hydroxide, by the aid of heat. This is considerably used as an astringent.

Aluminum Nitrate. $Al_2(NO_3)_6 \cdot 18H_2O$. By dissolving aluminum hydrate in nitric acid to saturation, filtering, concentrating and crystallizing. It is deliquescent.

Aluminum Oxalate. This may be prepared by dissolving aluminum hydroxide to saturation in a hot solution of oxalic acid, then evaporating and crystallizing.

Aluminum Phenolsulphonate. This preparation which is also called Aluminum Sulphocarbolate, may be prepared by dissolving aluminum hydroxide to saturation in phenolsulphonic acid, and evaporating the solution.

Aluminum Phosphate. $Al_2(PO_4)_3 \cdot 8H_2O$. This occurs native as a neutral gibbsite. Several basic phosphates also occur native as minerals, wavellite etc. Aluminum phosphate may be prepared in the laboratory by dissolving aluminum hydroxide to saturation in phosphoric acid and crystallizing or by mixing a neutral solution of alumina with a solution of sodium phosphate and collecting the precipitate.

Aluminum and Potassium Sulphate. The official Alumen, Alum. See this title in Part II.

Aluminum Salicylate. This may be prepared by dissolving aluminum hydroxide in a hot concentrated solution of salicylic acid, to saturation, and evaporating the solution.

Aluminum Silicate. Kaolin or China Clay. This is found widely distributed in nature and is produced by the weathering of various alkali aluminum double silicates, the alkali silicate being dissolved out, leaving the insoluble aluminum silicate. It is extensively used in the arts in the production of pottery and china ware, and is official in the U. S. Pharmacopœia as an ingredient of plastic applications.

Aluminum Sulphate. $\text{Al}_2(\text{SO}_4)_3 \cdot 16\text{H}_2\text{O}$. This is obtained by treating clay or aluminum shale with sulphuric acid. The product is dissolved in water and allowed to crystallize. It unites with alkali salts forming double sulphates, as the alums, either ammonium or potassium alum.

Aluminum Tanate. By triturating 1 part of aluminum hydrate and 2 parts of tannic acid with sufficient water to make a mixture the consistence of syrup, and then evaporating to dryness by a heat not over 120°F . It is used in dysentery, hemorrhage etc., in doses of three to twelve grains.

Aluminum Tartrate. This may be prepared by dissolving aluminum hydroxide to saturation in a strong solution of tartaric acid, evaporating the solution to crystallization, collecting and drying the crystals.

Other salts of aluminum may be prepared with other acids and elements, but the foregoing are all that are generally known.

For other aluminum salts and combinations see Part II.

AMMONIUM.

Sym. NH_4 ; at. wt. 18. A hypothetical metal, the analogue of potassium and sodium. Although it is not classed with the elements, it has the same characteristics as the alkali metals. The metal ammonium has not yet been authoritatively isolated, but it is reported that Weyl succeeded in obtaining it as a dark-blue liquid, having a metallic lustre. Its composition is therefore only known by its characteristics in its compounds, which correspond with the chemical formula (NH_4) assigned to it. It is a univalent radical like potassium or sodium and its compounds or salts closely resemble them.

The salts of ammonium are mostly colorless and very soluble in water; they are volatilized at high temperatures, and when heated with the hydrates of potassium, sodium or calcium are decomposed with evolution of ammonia gas.

The derivatives and salts of ammonium are extensively used in pharmacy, medicine and the arts, the commercial basis of them being chiefly the waste "ammoniacal liquor" of gas works, which is neutralized either with sulphuric acid, forming ammonium sulphate, or with hydrochloric acid, forming crude ammonium chloride, (sal-ammoniac), which may be converted into any of the ammonium compounds.

Ammonium Amalgam. The nearest approach to the metal ammonium is ammonium amalgam, which is made by dissolving potassium in mercury and adding a strong solution of ammonium chloride to it. It is a spongy metallic substance, which as soon as formed begins to decompose into ammonia, mercury and hydrogen.

Alkamides are ammonia compounds intermediate between amides and amines, containing both acid and basic radicals.

Amides are compounds derived from ammonia by replacing one or more of its atoms of hydrogen by an acid radical. All the known amides are white crystalline solids, many of them having both acid and basic properties. They include most of the non-volatile alkaloids and the ammonia derivatives of the haloid and etherial salts etc. They are known as monamides, diamides and triamides, according to their formation and combination.

Amidogen. NH_2 This is a hypothetical body composed of one atom of nitrogen and two of hydrogen. As its name indicates, it is the generator of amides, which it forms by combining with other bodies.

Amines are compounds derived from ammonia by replacing one or more of its atoms of hydrogen with a basic radical. They consist of the volatile

alkaloids, the artificial alkaloids, the ammonia derivatives of the alcohol radicals and other hydrocarbons etc. They are known as monamines, diamines, or triamines, according as the hydrogen is displaced from a single, double, or triple molecule of ammonia.

Ammonia. Ammonia Gas. Ammonium Hydrate.

Sym. NH_3 ; at. wt. 16.93.

Gaseous ammonia was first made known by Priestly in 1785. It is known by its peculiar odor and by its property of restoring the color of blue litmus which has been reddened by acids, or by forming a white cloud with the vapor of hydrochloric acid. In pharmacy its solution in water (which is known in the United States as ammonia water and in Great Britain, France and Germany as solution of ammonia) is the only form in which it is available, but in the arts gaseous ammonia is considerably employed. It is produced in nature by the decomposition of animal and some vegetable substances, but it is mainly supplied to commerce from the waste products of gas manufacture. It is retained for use in the form of some of its stable salts with acids.

It is strongly alkaline, and is sometimes called animal alkali, volatile alkali etc.

It unites with nearly all acids to form stable salts, and dissolves freely in water—1 volume of water dissolving nearly 700 volumes of the gas—but it escapes freely from its aqueous solution when exposed; hence the penetrating odor of ammonia water. In the form of gas it is used by inhalation from its solution as a quick stimulant and restorative for syncope, collapse etc., and as a domestic remedy for headache and many other ailments.

In the past few years ammonia gas, liquified by pressure, has come into extensive use for making ice and artificial cold. Ammonia gas is condensed, by pumping engines, to a liquid and conveyed through pipes, under pressure; where it is designed to produce cold the liquid ammonia is liberated into larger pipes where it again becomes gaseous, causing abstraction of latent heat, and low pressure.

Ammonium Salts.

Ammonium forms salts with nearly all the mineral and vegetable acids. They are generally colorless and very soluble in water. A few only are official in the U. S., less in the Br., and still less in the G. P. Those unofficial in the U. S. P., are but little used in medicine or pharmacy. The following are the salts of ammonia generally recognized. The official salts are more fully described in Part II.

Ammonium Arsenate. $(\text{NH}_4)_2\text{HASO}_4$. Made by saturating a concentrated solution of arsenic acid with ammonia water and allowing it to evaporate spontaneously. A double salt of arsenic frequently employed in medicine.

Ammonium Benzoate. $\text{NH}_4\text{C}_6\text{H}_5\text{O}_2$. U. S. Official in U. S., Br. and several European Ph. See Part II.

Ammonium Bicarbonate. $(\text{NH}_4)\text{HCO}_3$. Add one part of powdered ammonium carbonate to two parts of water, agitate and decant the liquid, the residue remaining is the ammonium bicarbonate.

Ammonium Bichromate. $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$. Official in Fr. under title Bichromate d'ammoniaque. See Part II.

Ammonium Biphosphate. This may be prepared by adding an excess of phosphoric acid to ammonia solution, evaporating and crystallizing.

Bisulphate and Bisulphite of Ammonium may be prepared in the same manner with corresponding acids.

Ammonium Bitartrate. By adding tartaric acid in excess to ammonia water, evaporating and crystallizing.

Ammonium Borate. $2(\text{NH}_4\text{HB}_3\text{O}_6) \cdot 3\text{H}_2\text{O}$. Dissolve one part of boric acid in three parts of warm ammonia water, 10 percent., allow to cool slowly and crystallize. Used for the same purpose as sodium borate or common borax.

Ammonium Bromide. NH_4Br . U. S. Official in most pharmacopœias. See Part II.

Ammonium Carbonate. $C_2H_{11}N_3O_3$. U. S. Official in all pharmacopœias. See Part II.

Ammonium Carbazotate or Picrate. Add carbazotic (picric) acid to stronger ammonia water to neutralize, allow to evaporate spontaneously and crystallize.

Ammonium Chloride. NH_4Cl . U. S. Official in all pharmacopœias. See Part II.

Ammonium Chloroplatinate. By saturating a solution of chloroplatinic acid with ammonia, evaporating and crystallizing.

Ammonium Chromate. By neutralizing a solution of chromic acid with ammonia water, evaporating and crystallizing.

Ammonium Citrate. $(NH_4)_3C_6H_5O_7 + 3H_2O$. Add citric acid to ammonia water to neutralize, concentrate and crystallize. This assists in dissolving salts of quinine and other salts of alkaloids.

Ammonium Dichromate. The same as Ammonium Bichromate. Prepared by adding chromic acid to saturation in ammonia water, evaporating and crystallizing.

Ammonium Embelate. Prepared by saturating a solution of embelic acid with ammonia. Used as a remedy for tape-worm. Dose, $\frac{1}{15}$ grain in pills, for children 3 times a day, for adults, 7 times a day.

Ammonium Fluoride. NH_4F . Made by saturating hydrofluoric acid with ammonia water.

Ammonium Formate. NH_4CHO_2 . Neutralize formic acid with ammonia water, concentrate and crystallize.

Ammonium Gallate. Add gallic acid to stronger ammonia water to saturation, concentrate and crystallize.

Ammonium Hydrosulphide or Sulphide. NH_4HS . By passing sulphuretted hydrogen gas through ammonia water, a solution may be obtained, or by mixing gaseous ammonia with sulphuretted hydrogen gas at low temperature crystals are formed.

Ammonium Hypophosphite. By neutralizing ammonia water with hypophosphorous acid, concentrating and crystallizing. This is used in combination with other hypophosphites in syrups and solutions.

Ammonium Iodide. NH_4I . U. S. Official in the U. S. and several of the European pharmacopœias. See Part II.

Ammonium Molybdate. Made by neutralizing molybdic acid with ammonia. **Ammonium Phosphomolybdate** is a compound with phosphoric acid. These salts are used as tests for organic bases, which they precipitate.

Ammonium Nitrate. NH_4NO_3 . Formerly official in U. S., Br. and several European pharmacopœias. See Part II.

Ammonium Nitrite. To a solution of silver nitrate add a solution of ammonium chloride and evaporate the cleared solution poured from the precipitate over sulphuric acid to dryness. This is used as a diuretic.

Ammonium Oxalate. To a hot solution of oxalic acid add ammonium carbonate until neutralized, concentrate the solution and crystallize. It is used in chemistry as a test for calcium, with which it produces a white precipitate soluble in nitric acid.

Ammonium Phenolsulphonate. The same as ammonium sulphocarbonate, see above.

Ammonium Phenylate or Phenylamine is produced in small quantities when carbolic acid is heated in sealed tubes with ammonia. It is known in the market as aniline or "aniline oil," the base of aniline dyes. See Aniline.

Ammonium Phosphate. $(NH_4)_2HPO_4$. Br. Official in Br. and some European pharmacopœias. See Part II.

Ammonium Picrate. Prepared by adding picric acid to ammonia water until saturated, then evaporating and crystallizing. Other acids may be combined with picric acid, and corresponding ammonium compounds prepared.

Ammonium Salicylate. $NH_4C_7H_5O_3$. U. S. Made official in the 8th revision. Add salicylic acid to ammonia water until it is neutralized, then evaporate and crystallize. Used in rheumatism and neuralgia, the same as sodium salicylate. See Part II.

Ammonium Succinate. Dissolve one part of succinic acid in four parts of water, neutralize with ammonium carbonate, in slight excess, evaporate and crystallize.

Ammonium Sulfoichthyolicum. *Ichthylol.* Official in the Swiss P. Obtained by the dry distillation of bituminous mineral containing fossil fish. Used externally.

Ammonium Sulphate. $(\text{NH}_4)_2\text{SO}_4$. This is the basic of many of the ammonium salts. It is produced by neutralizing gas liquor or foetid bone spirit with sulphuric acid and crystallizing. It is official in some European pharmacopœias and will be more fully described in Part II.

Ammonium Sulphide Solution. This may be prepared by passing sulphurous acid gas into ammonia water to saturation.

Ammonium Sulphite. NH_4HSO_3 . This is made by passing sulphurous acid gas into an alcohol solution of ammonia and collecting the precipitate.

Ammonium Sulphocarbonate. By neutralizing sulphocarbolic acid with ammonia, concentrating and crystallizing.

Ammonium Sulphocyanate. NH_4CNS . Neutralize hydrosulphocyanic acid with ammonia, or dissolve carbon bisulphide in alcohol and heat in the presence of ammonia water, then concentrate by evaporation and crystallize.

Ammonium and Potassium Tartrate. By adding ammonia water to a hot solution of cream of tartar until neutralized, concentrating and crystallizing.

Ammonium Tartrate. By neutralizing a solution of tartaric acid with ammonia, concentrating and crystallizing.

Ammonium Urate. $\text{C}_5\text{H}_3(\text{NO}_4)\text{N}_4\text{O}_3$. A white amorphous salt, formed by the union of uric acid and ammonia. It is used externally in the form of ointment, 20 grains to an ounce, for chronic eczema.

Ammonium Valerate. $\text{NH}_4\text{C}_4\text{H}_9\text{O}_2$. U. S. Also official in several European pharmacopœias. See Part II.

Ammonium Vanadate. Neutralize vanadic acid with ammonia, concentrate and crystallize.

Many other ammonium salts are formed with various acids and compounds, but these mentioned are all that are generally used in pharmacy.

ANTIMONY. (*Stibium*).

Sym. Sb. (*Stibium*); at. wt. (O=16) 120.2; sp. gr. 6.7; melts at 430°C . and vaporizes at a red heat, sp. gr. of vapor, 1640°C . is 9.78 (air=1); color, bluish, silver-white, with metallic luster; it is neither malleable nor ductile, but has a marked crystalline structure and is readily pulverized to a fine powder; crystals are octahedral, nearly cubical. It does not tarnish in air and is not readily acted upon by acids but is difficultly soluble in hot concentrated hydrochloric or sulphuric acids and more soluble in nitrohydrochloric acid.

It is both trivalent and quinquivalent. It combines with hydrogen forming stibine, SbH_3 , a gas, and with the halogens directly, producing scintillations; with oxygen forming three oxides, and with sulphur forming two compounds. These combinations will be further noticed in Part II. In periodic arrangement antimony is in Group V, Sub-group B, having characteristics similar to arsenic and phosphorous.

The metal antimony seldom occurs in nature as pure metal, but is found, abundantly, as a sulphide from which it is chiefly obtained. It forms alloys with many of the metals, especially with tin and lead, and has the peculiar property of expanding while cooling which makes it invaluable as an alloy for type-metal, stereotype-metal, linotype-metal and castings, which require expansion to fill matrices or forms.

Antimony was first made known by Valentine, a German alchemist, in 1450 and was the first of the combined elements to be isolated.

Stibnite, Sb_2S_3 , was known to the ancients and was mentioned by Dioscorides and Pliny as *Stibium*. This was sulphide of antimony and was used as a medicine and as a pigment for darkening eyebrows, but the metal itself was first made known by Valentine. Antimony metal is extensively used in the arts for making Babbitt metal and type metal alloys, and its chemical compounds are considerably used in medicine. See Part II.

Alloys.

The ore, stibnite, from which antimony is chiefly produced, was called by the alchemists *lupus metallorum* and the metal itself was called *regulus* or *regulus of antimony*. It is one of the most important alloy metals we possess. The principal alloys in which it is employed are:

Babbitt-Metal. The best Babbitt anti-friction metal, which is used as boxes for the journals or axles of machinery, is composed of tin 10 parts, copper and antimony, each 1 part. A cheaper alloy is made by using a portion of lead in place of tin.

Britannia-Metal. The best Britannia Metal is composed of tin 81 parts, antimony 16 parts, copper 2 parts, zinc 1 part. Other grades of Britannia are required to be softer for various purposes, and a smaller proportion of antimony is used. Lead is also used in cheaper grades in place of a portion of the tin.

Linotype-Metal, for typesetting machines; lead 85 parts, antimony 13 parts, tin 2 parts.

Pewter. The best plate pewter is made with tin 85 parts, antimony 8 parts, copper 5 parts, bismuth 2 parts. Cheap pewter is made of lead and tin only.

Stereotype-Metal is made of lead 112 parts, antimony 18 parts, tin 3 parts.

Type-Metal. This is made of lead 80 to 83 parts, and antimony 17 to 20 parts. Other metals are often added, and varying proportions of lead and antimony are used.

Lead 75 parts, antimony 20 parts, tin 5 parts; or lead 70 parts, antimony 25 parts, tin 5 parts, are good proportions. Many typefounders use a small proportion of copper in the alloy.

Salts.

Of the many salts and preparations of antimony that were formerly used in medicine, but few are now employed.

The following are the more important:

Antimony Arsenate and Antimony Arsenite. These compounds of antimony with arsenic occur naturally in many of the ores from which antimony is produced. They can also be made by combining them.

Antimony Bromide. SbBr_3 . Made by adding dry antimony to bromine in a retort, agitating until the reaction is complete, then purifying by distillation and collecting the crystals.

Antimony Fluoride. SbF_3 . By distilling antimony and fluoride of mercury together and collecting the white mass.

Antimony Iodide. SbI_3 . By combining antimony and iodine and allowing them to remain in combination until the reaction is completed.

Antimonious Oxide. Sb_2O_3 . This is official in the Br. P. and will be described in Part II.

Antimony Oxides. Besides the Br. official oxide (trioxide) of antimony, it forms a tetroxide, Sb_2O_4 , known as Antimonious Acid, and a pentoxide, Sb_2O_5 , known as Antimonic Anhydride.

Antimony Oxychloride. SbOCl . Powder of Algaroth. By pouring solution of antimony chloride into a considerable quantity of water, this salt is precipitated.

Antimony Oxsulphide. Kermes Mineral, Golden Sulphide of Antimony. By boiling one Troy ounce of sulphide of antimony for one hour with sixteen pints of water and twenty three Troy ounces of sodium carbonate, then allowing to stand 24 hours, collecting the precipitate, washing and drying. It is a mixture of sulphide and oxide of antimony; was formerly official but is now seldom used. Uses the same as sulphurated antimony.

Antimony Sulphate. $\text{Sb}_2(\text{SO}_4)_3$. By boiling antimony with strong sulphuric acid and collecting the white mass.

Antimony and Potassium Tartrate. Tartar Emetic. This is the only antimony compound now official in the U. S. P. It will be described in Part II.

Antimonious Sulphide. This is official in the Br. P. under the title Antimonium Nigrum Purificatum; the process for preparing it is given in Part II.

Antimony Trichloride. SbCl_3 . Prepared by treating antimony sulphide or oxide with concentrated hydrochloric acid. This forms a soft laminar-crystal-

line mass which was formerly known as "Antimony Butter." This melts at 73.5°C . and boils at 223.5° . It dissolves in water containing hydrochloric acid. When water alone in excess is added it is decomposed, forming the oxychloride of antimony known as "Powder of Algaroth," which was formerly used in medicine. Solution of antimony chloride was official in the 1885 Br. P.; but is now dismissed. This solution was commonly, but improperly called Butter of Antimony.

Crocus of Antimony is made by fusing equal parts of black antimony and saltpetre together. **Liver of Antimony** by fusing 7 parts of black antimony with 2 parts of dry sodium carbonate. **Ethiops of Antimony** by triturating 1 part of mercury with 2 parts of black antimony until the mercury is extinguished.

Sulphurated Antimony. Kermes Mineral, is also official in the Br. P. Its formula will be found in Part II.

Vitrified Antimony. Glass of Antimony. By roasting antimony sulphide first in a shallow vessel, and then melting it in a crucible, and pouring it upon an iron plate.

ARGON.

Sym. A; at. wt. (O=16) 39.88; density, 1.782 (air=1).

A colorless, odorless gas. Its molecules consist of only one atom. It may be condensed by compression of about 50.6 atmospheres and by cooling with boiling oxygen, to a colorless liquid which boils at -186°C . It solidifies at -189°C . It has not as yet been found to combine with any other element.

Argon was discovered in the atmosphere by Rayleigh and Ramsay in 1894 and it was found that the atmosphere contains of this gas 0.9 per cent, by volume or 1.2 per cent. by weight. It was so associated with nitrogen that it had been previously overlooked in investigations of the atmosphere. 1 liter of so-called nitrogen from the air at 0°C . weighed 1.2572 grams, while nitrogen obtained from chemical compounds weighed 1.2521 grams. This led the investigators to the discovery of the element, Argon, as distinguished from nitrogen, and also led to the discovery of helium, neon, krypton and xenon, as constituents of the atmosphere.

These five gases are not known to combine with any other elements and are simply mixtures in the atmosphere with its other gaseous constituents. They form the Zero group of the Periodic system and are, so far, unavailable for any known purpose.

ARSENIC.

Sym. As; at. wt. (O=16) 75; sp. gr. cryst. 5.7, amorp. 4.71; volatilizes without melting but may be melted under pressure at higher temperatures; vapor density at 860°C . (air =1) 149.84; density less at higher degree of heat; sublimes at 200°C . Two allotropic forms occur, *amorphous*, black, shiny mass, very brittle, like glass; *crystalline*, acute, hexagonal rhombohedra, marked metallic luster, steel-gray color; the amorphous form is changed into the crystalline by heating to 360°C . When arsenic is heated in a glass tube the amorphous form is deposited in the tube near the flame as a black mirror, while the bright, shiny crystals of the other form appear further on in the cooler portion of the tube. When heated to 450°C . arsenic volatilizes giving vapors of lemon-yellow color and strong garlicky odor. It is neither malleable nor ductile but is a good conductor of heat and electricity. Chemically, arsenic is almost entirely a not-metal and unites directly with most metals, forming arsenides; it also has metal characteristics and is, therefore, classed both with the metals and not-metals. Arsenic is used in shot-making to give them smooth spherical form, and its oxides are extensively used in making aniline dyes and glass. For chemical compounds of arsenic, see Part II. Arsenic was discovered in 1694 by Schröder, a German chemist.

Arsenic is both trivalent and quinquivalent, with hydrogen it forms the gas, arsine, AsH_3 with the halogens it forms poisonous compounds, with oxygen it forms two compounds and with many metals arsenous or arsenic salts corresponding to the oxides, and with sulphur and phosphorus it forms characteristic compounds. In periodic arrangement it is in Group V, Series 5, having properties similar to phosphorus and antimony.

Arsenic very much resembles Antimony in its chemical characteristics. It is found in nature as a free metal, but is more abundant in ores, or combined with other metals as an alloy, or in the form of salts, its sulphides being most common. With oxygen it forms Arsenous Oxide, As_2O_3 , and Arsenic, As_2O_5 , which is the white arsenic of commerce. With sulphur it forms a disulphide known as **realgar** or **ruby sulphur**, As_2S_2 ; a trisulphide known as **orpiment** or yellow sulphide, As_2S_3 ; and a pentasulphide, As_2S_5 . With hydrogen and oxygen it forms true Arsenous Acid, H_3AsO_3 , and Arsenic Acid, H_3AsO_4 ; the former combines with some bases to form salts known as **Arsenites**, and the latter form **Arsenates**.

The oxides and sulphides of arsenic are considerably used in the arts, and somewhat, though not so much as formerly, employed in pharmacy and medicine.

Arsenic Compounds.

In the U. S. P. Arsenious iodide and Arsenic trioxide are official. But few other arsenic salts are used. The following list includes the more important:

Arsenic Antidote. This is official in the U. S. P. under the title *Ferri Hydroxidum Cum Magnesium Oxido*. The formula etc., will be found under that heading in Part II.

Arsen- and Arseno- Compounds. A great many compounds of arsenic with other elements and organic derivatives are found in the market and are usually known under brand or trade names. Several of these will be mentioned under Arsenic Trioxide in Part II.

Arsenic Bisulphide, or Realgar. As_2S_2 . Made by fusing together 5 parts of arsenous acid and 3 parts of sulphur.

Arsenic Bromide. AsBr_3 . By dusting arsenic in powder in a retort filled with bromine vapor, and distilling.

Arsenic Chloride. AsCl_3 . By acting on metallic arsenic with chlorine gas.

Arsenic Iodide. AsI_3 . Prepared by the direct combination of arsenic and iodine. It is official and is used as a caustic in solution for morbid growths and warts, and for preparing Donovan's Solution, which is administered internally as an alternative. See Part II.

Arsenic Phosphate and Arsenic Phosphide are combinations of phosphorus with arsenic, sometimes used in medicine. They are supplied by manufacturing chemists.

Arsenic Trioxide. As_2O_3 . The white arsenic of commerce, official in all pharmacopœias. It is fully described in Part II.

Arsenic Trisulphide or Orpiment. As_2S_3 . By fusing 5 parts of arsenous acid with 5 parts of sulphur.

Sodium Arsenate. U. S., Br. See *Sodii Arsenas*.

BARIUM.

Sym. Ba; at. wt. (O=16) 137.37; sp. gr. 3.75; melts at 850°C .; not volatile; color, greenish, silver-white; gradually oxidizes in air, forming barata or barytes, (barium oxide), BaO ; decomposes water vigorously, forming barium hydroxide, $\text{Ba}(\text{OH})_2$; malleable; combines as a bivalent with the halogen elements and most of the acids.

Barium is one of the group of alkaline earths and occurs native as barite or heavy spar, BaSO_4 , and as witherite, BaCO_3 . In preparing salts of barium witherite is first reduced by ignition with charcoal and the product then dissolved in any of the acids.

In periodic arrangement, barium is in Group II, Series 8, classed with calcium, strontium etc.

Barium was isolated both by Davy and Berzelius in 1808. It is now mostly prepared from the fused chloride by electrolysis. The salts of barium are much used in the arts and considerably in medicine, especially in the preparation of hydrogen peroxide solution.

Salts of Barium.

No salts of barium are now official in the U. S. or Br. P., but a few are recognized in European pharmacopœias. Barium Dioxide was official in the 7th revision of the U. S., but has been dismissed.

The following is a list of the chemical compounds of Barium which may be required in chemistry or medicine. Several of the barium salts are used for making test solutions.

Barium Acetate. $\text{Ba}(\text{C}_2\text{H}_3\text{O}_2)_2$. Made by neutralizing acetic acid with barium carbonate, evaporating and drying.

Barium Arsenate. $\text{Ba}_3(\text{AsO}_4)_2$. By precipitating a solution of potassium arsenate with a solution of barium chloride. Given in skin diseases in doses of $\frac{1}{16}$ to $\frac{1}{4}$ grain.

Barium Benzoate. $\text{Ba}(\text{C}_7\text{H}_5\text{O}_2)_2 + 2\text{H}_2\text{O}$. By neutralizing a solution of benzoic acid with barium carbonate, evaporating and crystallizing.

Barium Bromide. $\text{BaBr}_2 \cdot 2\text{H}_2\text{O}$. By saturating a solution of caustic baryta with hydrobromic acid, evaporating and crystallizing.

Barium Carbonate. BaCO_3 . This is found abundantly in nature, the native carbonate being called **Witherite**. This is sufficiently pure for industrial and commercial purposes. It is used as the manufacturing basis of most of the barium salts, also for tests. It is very poisonous. May be employed as a rat poison or for other similar purposes. It is also used in face powder and liquid cosmetics, and is considerably used in place of lead carbonate for adulterating paint.

Barium Chloride. $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$. By dissolving barium carbonate in hydrochloric acid, evaporating and crystallizing. Used for making test solutions (see Solutions), and in medicine as an alternative, in doses of $\frac{1}{4}$ to $\frac{1}{2}$ grain, also externally in solution.

Barium Chromate. BaCrO_4 . By adding baryta water (solution of caustic barium) to a solution of potassium chlorate, washing and drying the precipitate.

Barium Dioxide. BaO_2 . This barium salt is used chiefly for the production of solution of hydrogen peroxide. It is almost insoluble in cold water, but dissolves readily in hydrochloric, phosphoric or other mineral acids, which decompose it, forming salts of barium corresponding to the acids used.

Barium Hydroxide or Hydrate. $\text{Ba}(\text{OH})_2$. By digesting caustic baryta (barium oxide) with a little water, the elements of the water are assimilated, yielding barium hydroxide, or it may be crystallized from baryta water by evaporation. **Baryta Water** is made by dissolving the hydroxide thus formed in water to saturation. Used as a test solution.

Barium Iodide. Ba_2I . By adding iodine gradually in excess, to a solution of barium sulphate. When the reaction is finished filter the solution, evaporate and crystallize.

Barium Nitrate. $\text{Ba}(\text{NO}_3)_2$. By decomposing a solution of sodium nitrate with a solution of barium chloride, collecting the precipitate, washing and drying. This is used for making a test solution. (See Solutions).

Barium Oxalate. BaC_2O_4 . By precipitating a solution of barium oxide with a solution of oxalic acid, collecting, washing and drying.

Barium Oxide. Baryta. Barytes. Caustic Baryta. BaO . This is a very caustic, corrosive, alkaline substance, which may be made by calcining some of the salts of barium, or decomposing solution of barium sulphide by oxide of zinc. **Barii Dioxidum, Barium Dioxide or Barium Peroxide**, BaO_2 , is prepared by passing a stream of oxygen or air through a tube containing baryta heated to a dull redness. By treating with diluted hydrochloric acid it yields solution of hydrogen peroxide (H_2O_2).

Barium Sulphate. BaSO_4 . This is found native as baryte or heavy spar, or may be prepared by decomposing a solution of barium chloride with sulphuric acid, collecting the precipitate, washing and drying.

Barium Peroxide, BaO_2 , is formed upon heating the oxide in a current of air or oxygen, the vapor introduced into dilute sulphuric acid causes a precipitate of barium sulphate and leaves hydrogen peroxide free in the solution.

Barium Sulphide, BaS , and **Barium Sulphite**, BaSO_3 , are other compounds of sulphur and oxygen with barium, sometimes used.

Some of the barium salts are used in combination with chlorides for making colored fires of a greenish color, or for giving a greenish color to flame.

Antidotes. For poisoning by soluble salts of barium any of the soluble sul-

phates in solution may be given, as Epsom Salts, Glauber's Salt, alum etc. They form insoluble barium sulphate.

Other compounds of barium will be noted in Part II.

Many other compounds of barium are made by manufacturing chemists, but are seldom used except for testing. They are listed in chemical catalogues and may be had if desired.

BERYLLIUM. (Glucinum).

Sym. Be or Gl; at wt. 9.1; sp. gr. 1.64; has a bright, white luster and is permanent in air at ordinary temperatures. It does not decompose water vapor at red heat, is malleable and resembles aluminum in its chemical properties.

In periodic arrangement it stands at the head of Group II, Series 2, having properties similar to magnesium.

This rare element does not occur in nature, but is found chiefly in beryl from which it was isolated by Wöhler and Bussy, German chemists, in 1828. They obtained it by fusing beryl with potassium carbonate, treating the fused mass with sulphuric acid which precipitated silica and formed alum, which crystallized out, while beryllium sulphate remained in solution; this solution was then mixed with hot solution of ammonium carbonate to precipitate aluminum and iron and beryllium still remained in solution. The solution was then acidified with hydrochloric acid and the beryllium hydroxide precipitated by the addition of ammonia. The metal may be obtained from its hydroxide by reduction. It forms one oxide, BeO ; hydroxide, $\text{Be}(\text{OH})_2$; sulphate, BeSO_4 ; chloride, BeCl_2 and many other combinations with acids. It is not used medicinally.

BISMUTH.

Sym. Bi; at. wt. ($\text{O}=16$) 2.8; sp. gr. 9.82; melts at 286.3°C . and boils above 1000°C .; reddish-white color, metallic luster, crystallizes, very brittle, unaffected by air at ordinary temperatures but on being heated in air becomes a trioxide, combines directly with the halogens, but is not acted upon by hydrochloric or sulphuric acids at ordinary temperatures. With nitric acid it combines forming bismuth nitrate (neutral) $\text{Bi}(\text{NO}_3)_3$ and by treating the nitrate with 20 parts of boiling water forms bismuth subnitrate in which form it is chiefly used in medicine.

Bismuth was first discovered by Valentine, a German alchemist, in 1450. It is found chiefly native, but is also found as a sulphide ore, bismuth glance, Bi_2S_3 , and as a telluride. The native metal is usually very pure, but if refining is necessary the melted metal is poured over a hot, slightly inclined plate of iron so that impurities are oxidized.

Because of its readily fusible qualities when alloyed with certain metals it is considerably employed for making fusible metals. See alloys.

Bismuth is both trivalent and quinquivalent, being grouped with antimony and arsenic in periodic arrangement, Group V, Series 11. No hydrogen compounds of bismuth have been found.

Bismuth combines with most of the organic acids, forming compounds used in medicine. See Part II.

Alloys.

When Bismuth is melted, upon cooling is expands $\frac{1}{32}$ of its volume. This property makes it valuable for making electrotype plates and castings which are required to expand upon cooling, but because it is not so hard as antimony which has the same property and because of its greater cost, it is but little used for this purpose. The following are the chief alloys of bismuth:

Bismuth Amalgam is formed by adding 2 parts of hot mercury to 1 part of fused bismuth.

Electrotype moulds. An alloy for electrotype moulds may be made with bismuth 8 parts, lead, 8 and tin 3. It melts at 223°F ., and is allowed to cool until it becomes pasty, when the warmed cut, medal, or other device is pressed upon it and kept in contact until cool.

Fusible Metal. With lead and tin bismuth forms alloys known as Fusible Metal, which have very low melting points, the temperature required to fuse them being less than that of boiling water.

Darcet's Fusible Metal consists of bismuth 2 parts, lead 1 part, tin 1 part. It fuses at 93°C . (199.2°F .). Another combination of the three metals liquifies at a still lower temperature. When cadmium is added the fusibility of these alloys is increased.

Newton's Fusible Metal consists of bismuth 8 parts, lead 1 part, and tin 3 parts. It fuses at 94.5°C . (202°F .).

Wood's Fusible Metal consists of 1 to 2 parts of cadmium, 2 of tin, 2 of lead, and 7 to 8 parts of bismuth, melts between 66° and 71°C .; another described by Lipowitz, consists of 8 parts of lead, 15 of bismuth, 4 of tin, and 3 of cadmium, softens at 55° and liquifies at 60°C .

These alloys are used as safety plugs for water pipes designed for fire protection; when the heat in a room rises to a degree which melts the alloy, water is liberated from a sprinkling device and the fire is automatically extinguished.

Soft Solder for mending pewter and other ware, melting at a low temperature, is made by melting together 1 part of bismuth, 2 of tin, and 1 of lead. This same composition is also used as a bath for tempering steel, and for making moulds for cakes of fancy soap etc.

Other alloys of bismuth with silver, platinum, copper or other metals may be made but they have no industrial application.

Salts of Bismuth.

The following salts of bismuth are prepared and many of them are used in medicine:

Bismuth Acetate. This may be made by the interaction of bismuth subcarbonate with acetic acid until the acid is neutralized, then evaporating the solution to dryness by gentle heat.

Bismuth Benzoate. This may be prepared by adding a solution of 76 parts of sodium benzoate in 200 parts of cold distilled water, to a solution of 100 parts of bismuth nitrate in 20 parts of glycerin and 60 parts of distilled water. The precipitate is collected and dried without heat. It contains 27 percent. of benzoic acid.

Bismuth Beta-Naphthol. **Orphol.** A brown insoluble powder prepared by the union of a bismuth salt with B-naphthol and containing 23 percent. of naphthol. It is given as an antiseptic in intestinal troubles, especially of children. Adult dose 5 to 15 grains, children 2 to 3 grains.

Bismuth Bitannate. **Tannismuth.** A light-yellow powder having a slightly astringent taste, insoluble in water. It is said to contain 21 parts of bismuth, combined with tannin to form the powder. Used chiefly as an intestinal astringent. Dose, 5 to 15 grains.

Bismuth Bromide. BiBr_2 . Made by adding bromine in excess to metallic bismuth, and when their combination is complete, collecting the steel-gray mass.

Bismuth Basic Chloride. BiCl_3 . By dropping hydrochloric acid into a solution of bismuth nitrate, collecting, washing and drying the precipitate. This is known as bismuth subchloride or pearl powder, and is considerably used in face powders and liquid cosmetics.

Bismuth Chromate. $3\text{Bi}_2\text{O}_3 \cdot 2\text{CrO}_3$. By adding a solution of bismuth nitrate to a moderately concentrated solution of potassium bichromate in slight excess, and collecting the precipitate.

Bismuth Citrate. $\text{BiC}_6\text{O}_5\text{H}_5\text{O}_7$. This is official in the U. S. P. See formula for its preparation in Part II.

Bismuth and Ammonium Citrate. This is official in the U. S. P. See formula, Part II.

With ammonia bismuth citrate forms a double salt soluble in water and elixir, which is considerably used in medicine.

Bismuth Disalicylate. **Gastrosan.** A white, sweetish, odorless, powder, prepared by combining bismuth and salicylic acid. It is used for its salicylic acid effect, which is modified in its irritative action on the mucous membrane by the presence of the bismuth.

Bismuth Dithiosalicylate. Thioform. A yellowish-brown powder, odorless and insoluble in ordinary solvents, and said to contain 72 percent. of bismuth oxide and about 28 percent. of dithiosalicylic acid. It is used externally as a drying application to wounds, ulcers etc., and is given as an astringent and antiseptic in stomach and intestinal troubles. Dose, 5 to 15 grains.

Bismuth Hydroxide, $\text{Bi}(\text{OH})_3$, may be obtained by precipitating a bismuth salt with an alkali.

Bismuth Lactate. By mixing the freshly precipitated moist bismuth oxide, prepared from 10 parts of bismuth subnitrate, by boiling with excess of solution of soda, with 9 parts of lactic acid, and drying the mass on a water-bath.

Bismuth Methyl digallate. Bismal. A gray-blue powder prepared by the interaction of methyl digallate with bismuth carbonate. Used as an astringent in diarrhoeas, and as an astringent application for ulcers etc. Dose, internally, 2 to 5 grains.

Bismuth Methylenedisalicylate. Bisformasal. A brand name for a compound of bismuth formaldehyde and salicylic acid. A white, insoluble powder, prescribed as an intestinal antiseptic and astringent. Dose, 10 to 20 grains.

Bismuth Nitrate. $\text{Bi}(\text{NO}_3)_3$. Bismuth Ter- or Tris-Nitrate. Made by dissolving bismuth in sufficient nitric acid to effect its solution, adding to the solution half its volume of distilled water, filtering through glass-wool, evaporating and crystallizing. This is used for making some other salts of bismuth and for hair dye etc.

Bismuth Oxalate. $\text{C}_6\text{Bi}_2\text{O}_{12}\cdot 15\text{H}_2\text{O}$. By mixing bismuth nitrate with a solution of oxalic acid, and collecting the precipitate.

Bismuth Oxide. Bi_2O_3 . This is official in the Br. P. and Fr. Ph. It is more fully described in Part II.

Bismuth Oxides. Four oxides of bismuth are known, BiO , Bi_2O_3 , BiO_2 and Bi_2O_5 . Bismuth trioxide, Bi_2O_3 , is most commonly known.

Bismuth Oxycarbonate. $(\text{Bi}_2\text{O}_2\text{CO}_3)_2\cdot \text{H}_2\text{O}$. This is official in the Br. P., under the Latin title *Bismuthi Carbonas*. See Part II.

Bismuth Oxychloride. BiOCl . By pouring a solution of bismuth in nitric acid into a solution of sodium chloride, collecting the precipitate, washing and drying.

Bismuth Oxyiodogallate. Airol. A grayish-green powder, odorless and bulky, designed as a substitute for iodoform. It is prepared by the action of hydriodic acid upon bismuth subgallate, and is said to contain 20 percent. of iodine. Its uses are similar to iodoform, and, being bulky, it is useful in combination with talcum, boric acid etc., in the form of powder, or as an ingredient of ointments, pastes, solutions etc.

Bismuth Oxyiodo-methylene-digalate. Iodomuth. A reddish-brown powder, odorless and tasteless, prepared by a complex process, and said to contain about 25 percent. of iodine. It is used similarly as iodoform, externally as an astringent in consumption of the bowels. Dose, 5 to 30 grains.

Bismuth Oxyiodo-tannate. Ibit. This is a greenish-gray powder, odorless and tasteless, prepared by combining iodine, tannin and bismuth. It is insoluble and is used as an antiseptic application for wounds etc.

Bismuth Phosphate, Soluble. Bisol. A soluble phosphate of bismuth is prepared by manufacturing chemists. It is a white powder soluble in 3 parts of water, and is given as an astringent for intestinal irritation. Dose, 3 to 8 grains.

Bismuth Subcarbonate. This is official in the U. S. P. See Part II. It is astringent and tonic and its use in medicine is similar to bismuth subnitrate.

Bismuth Subgallate. Dermatol. $\text{C}_6\text{H}_2(\text{OH})_3\text{COOBi}(\text{OH})_2$ This preparation which has been introduced under the name "Dermatol" as a substitute for iodoform is a yellowish-red, fine powder, without odor. It is used as a dusting, either alone or in combination with starch or other absorbents; and as an application mixed with glycerin, oil, collodion or other liquids; or in the form of ointment or gauze.

Bismuth Subiodide or Oxyiodide. This compound is recommended as a substitute for iodoform; and may also be given internally in doses of from 5 to 10 grains.

Bismuth Subnitrate. U. S. Bismuth Oxynitrate, Br. This is official in all pharmacopœias, and is the basis of most of the bismuth salts. It is extensively used in medicine as an astringent, tonic and sedative. It is more fully described in Part II.

Bismuth Subsaliolate. This is official in the U. S. P. under this title and in the Br and several of the European pharmacopœias under the title Bismuth Salicylate. It will be more fully described in Part II.

Bismuth Sulphate, $\text{Bi}_2(\text{SO}_4)_3$, is formed when the metal is heated with concentrated sulphuric acid. Bismuth trisulphide is found in nature.

Bismuth Sulphocarbolate. A combination of bismuth with sulpho-carbolic acid. Used as an antiseptic and antiputrescent.

Bismuth Tannate. By dissolving 22 parts of bismuth nitrate in the least requisite quantity of nitric acid diluted with half its weight of water, pouring the solution into an excess of soda solution, collecting the precipitate, washing and triturating the moist precipitate with 10 parts of tannin, rubbed with water, straining and drying.

Bismuth Tartrate. By adding a hot concentrated solution of tartaric acid to a solution of bismuth oxide in nitric acid, and washing the precipitate with an aqueous solution of tartaric acid.

Bismuth Terchloride. BiCl_3 . By mixing two parts of powdered mercury bichloride with one part of powdered bismuth, and heating until the mercury is driven off.

Bismuth Tribromphenalate. This is official in the Germ. S. and has a complicated formula. It is seldom used in the U. S.

Bismuth Valerate. By dissolving nitrate of bismuth in the least requisite quantity of nitric acid, diluted with half its weight of water, then adding a concentrated solution of sodium valerianate, washing the precipitate with water mixed with valerianic acid, and drying by gentle heat.

Other salts of bismuth may be made by combining bismuth with other acids.

A great number of combinations of bismuth with other elements and with organic substances may be prepared and are useful in medicine. Many of the preparations of bismuth are known by coined names, other than is expressed by their chemical titles, and will be referred to in Part II. of this work.

BORON.

Sym. B; at. wt. (O=16) 11; sp. gr. (amorphous) 2.45; trivalent.

The element boron occurs in nature only in combination. It may be obtained by the reduction of boric anhydride, B_2O_3 , or borax by ignition with magnesium powder. The product is treated with boiling water and hydrochloric acid and then with hydrofluoric acid or fused borax. It is then treated again with boiling water and the insoluble amorphous element boron filtered out. This is a chestnut-brown powder having sp. gr. 2.45. It is insoluble in any ordinary solvents and is not fused even in the electric arc; it is, however, dissolved in molten aluminum and crystallizes from its solution in this metal in transparent, slightly colored crystals with a refractive power and hardness nearly equal to the diamond. The crystallized boron is much less readily affected by chemicals than the amorphous variety. Amorphous boron ignites with fluorine and chlorine, forming compounds directly with them, in air it burns to the oxide B_2O_3 and at a very high temperature it ignites with nitrogen to form boron nitride, BN, and is one of the very few elements that unite directly with nitrogen. It decomposes water at red heat and reduces many of the metallic oxides. Heated with nitric and sulphuric acids it is converted into boric acid and it is also, like aluminum, attacked by boiling caustic alkalis.

Boron was isolated by Davy and Gay-Lussac in 1808. It belongs to the aluminum periodic group. The element is comparatively unknown, but its compounds are extensively employed in the arts and in medicinal compounds, boric acid and borax being important antiseptics. See Part II.

Boric Acid. H_3BO_3 . This acid of boron unites with some bases forming borates or boro-compound salts. It is official in most of the pharmacopœias

and will be more fully described under the title *Acidum Boricum* in Part II. The compounds of this acid with bases are noted, generally, under the name of the base with which it is combined: as sodium borate, borax etc.

BROMINE.

Sym. Br; at. wt. (O=16) 79.92; sp. gr. at 0°C. 3.188; solidifies at -7.3°C. and boils at 59°C.; the molecule contains two atoms; vapor density 79.92 (O=16). A dark brown liquid at ordinary temperatures, the only liquid element except mercury; soluble 3.5 parts in 100 parts of water, the addition of potassium bromide to the water increases its solubility. In the periodic arrangement of the elements it appears in Group VII, Sub-group A, with fluorine, chlorine and iodine, having similar characteristics.

Bromine was discovered by Ballard, a French chemist, in 1826. It is obtained commercially from the mother liquor remaining after the crystallization of salt from natural salt water and as a by-product of salt manufacture; also near Strassfurt, Germany, where there are extensive beds of rock salt, it is found in the "Abraum-salze," lying above the rock salt. These salts were formerly a waste product, having to be removed to get at the rock salt beneath, but they were found to be rich in potassium and bromide compounds and bromine is now largely obtained from this source.

Bromine combines directly with most of the metals forming bromides and with hydrogen forming hydrobromic acid which unites with a great number of compounds useful in medicine and the arts. The element bromine unites with the other halogen elements iodine, chlorine and fluorine and its acids with organic bases forming a large line of chemical salts used in medicine. See Part II.

Combinations of bromine with other halogens generally bear the names of the combining elements, as Bromine Fluoride, Bromine Chloride, Bromine Iodide etc. Its compounds with bases usually have the basic name and bromide following, as Sodium Bromide, Potassium Bromide etc. The compounds of bromine other than the metallic bases will be noted under the title Bromine in Part II.

CADMIUM.

Sym. Cd; at. wt. (O=16) 112.40; sp. gr. 8.6; melts at 315°C., boils at 778°C.; the molecule in gaseous state consists of one atom.

A white rather soft metal, not affected by air at ordinary temperature, but upon heating in air burns, forming a brown cloud of cadmium oxide; difficultly soluble in dilute hydrochloric or sulphuric acid, but readily soluble in dilute nitric acid.

Cadmium was discovered by Herman and Stroymeyer, German chemists, in 1817. It occurs in zinc ores and, being more volatile than zinc, distills over first and may be recovered from the distillate containing it by subsequent redistillation and purification. In the periodic arrangement of the elements it appears in Group II, Sub-group B, being closely related to beryllium, magnesium and mercury. It unites with halogens and with many of the acids forming compounds, some of which are used in photography and as pigments but not employed as medicine.

Cadmium is very malleable and ductile, and though it is similar to tin in general characteristics, it is harder and more tenacious. When heated to about 80°C. it becomes very brittle and may be powdered. Added to some other metals in small proportions it makes very fusible alloys.

Cadmium Salts.

The following are the principal salts of cadmium:

Cadmium Bromide. CdBr_2 . By adding a solution of potassium bromide to a solution of cadmium sulphate, double decomposition occurs, potassium sulphate being precipitated, and the solution of cadmium bromide poured off, concentrated and crystallized. Used in photography.

Cadmium Carbonate. CdCO_3 . By adding a solution of cadmium nitrate to a solution of sodium carbonate, collecting the precipitate, washing and drying.

Cadmium Chloride. CdCl_2 . By dissolving cadmium carbonate in dilute hydrochloric acid, concentrating the solution and crystallizing.

Cadmium Hydroxide. $\text{Cd}(\text{OH})_2$. Prepared by precipitating a solution of cadmium nitrate with sodium hydroxide and collecting the precipitate.

Cadmium Iodide. CdI_2 . By double decomposition between potassium iodide and cadmium sulphate, the same as in making calcium bromide. This is used for sensitizing photograph plates. It is also used in medicine as an alterative.

Cadmium Nitrate. Cd_2NO_3 . By dissolving metallic cadmium in nitric acid, concentrating and crystallizing.

Cadmium Oxide. CdO . By igniting the nitrate or carbonate. A suboxide of cadmium, Cd_2O , is also known.

Cadmium Salicylate. This combination of cadmium with salicylic acid may be prepared by neutralizing a hot concentrated solution of salicylic acid with cadmium and evaporating. It is employed as an astringent in treatment of the eyes, in gonorrhœa, and in general conditions when an antiseptic astringent is indicated.

Cadmium Sulphate. $\text{CdSO}_4 \cdot 4\text{H}_2\text{O}$. By treating cadmium carbonate or oxide with dilute sulphuric acid.

Cadmium Sulphide. CdS . By passing a current of hydrosulphurous acid gas through a solution of cadmium chloride. This is a brilliant yellow pigment.

Cadmium Sulphocarbolate. A combination of phenol with cadmium, which may be made by dissolving cadmium hydroxide to saturation in phenol and condensing the product.

Cad-Formal. A cadmium salt of methylene-disalicylate. It is employed as an ointment in combination with lanolin, 1:7, in the treatment of scrofulous swellings and ulcers, also for enlarged joints and other conditions in which a discutient and absorbent are required.

CÆSIUM.

Sym. Cs; at. wt. ($\text{O}=16$) 132.81; sp. gr. 1.85; melts at 26.5°C ., boils at 270°C ., and is grouped in periodic arrangement with lithium, sodium, potassium and rubidium, with which it is analogous. It has no use in medicine.

A silvery white metal of strong basic characteristics. When exposed to the air it soon ignites forming an oxide. It dissolves in water forming a hydroxide. It is the most positive metal known.

Cæsium was discovered by Bunsen and Kirchhoff, in 1860, by spectrum analysis and derives its name from Cæsius (sky-blue) because of the line it formed in the spectrum. It was obtained from the very rare mineral pollux found on the isle of Elba, which is a silicate of aluminum and cæsium, containing about 30 per cent. of cæsium.

CALCIUM.

Sym. Ca; at. wt. 40.09; sp. gr. 1.78 to 1.87; melts at 760°C .; has a crystalline fracture and is soft enough to cut readily; is malleable, but less so than potassium and sodium. Its molecule consists of two atoms.

A silvery white metal, not occurring native but in combination; is one of the ten chief constituents of the earth's crust. Calcium carbonate is found in extensive deposits of limestone, calcite, aragonite, marble and chalk and the earthy deposit marl, contains a considerable proportion. Calcium silicates constitute a large part of the siliceous rocks, calcium phosphate is deposited in large quantities and calcium sulphate, in the form of gypsum and alabaster, are abundant, while the fossil remains of animals, the shells of mollusks and the ashes of plants are largely calcium combinations of some sort.

The metal is but little affected by oxygen, bromine or chlorine at ordinary temperatures. Calcium belongs to the family of alkaline earths and in the periodic arrangement of the elements is in group II, Sub-group A, being associated in chemical characteristics with strontium, barium and radium. It unites with halogen elements and with most of the acids, forming compounds extensively used in the arts and industries and considerably used in medicine, which will be noted in Part II. It is a necessary ingredient of all vegetable and animal bodies.

Calcium metal was isolated by Davy, in 1808. It may be obtained by electrolysis or by decomposing calcium iodide with sodium at red heat. The metal itself is seldom used except for laboratory experiments.

Calcium Salts and Compounds.

The following are the principle salts and compounds of Calcium. Several that are official or important are further noticed in Part II.

Calcium Benzoate. By adding calcium carbonate to a hot solution of benzoic acid until neutralized, then evaporating and crystallizing. Soluble in 18 parts of cold water. Dose 10 grains.

Calcium Biphosphate. Prepared by adding phosphoric acid in excess to calcium carbonate, filtering the solution and evaporating. It is used for the same purposes, medicinally as calcium phosphate, but is more soluble.

Calcium Bromide. CaBr_2 . This is prepared by the action of hydrobromic acid on precipitated chalk to neutralize; filter and evaporate to dryness, stirring to granulate. This is official in the U. S. P. See Part II.

Calcium Cacodylate. A calcium compound with cacodylic acid, in the form of a white powder, soluble in water. It is used as an alterative similar to arsenous acid. Dose $\frac{1}{2}$ to 2 grains.

Calcium Carbonate, CaCO_3 , occurs in several forms and conditions. It is a constituent of most all river and spring waters making them "hard" in different degrees according to other constituents of the water. When calcium carbonate is fused it becomes marble. Precipitated calcium carbonate is employed as medicine and in tooth and face powders.

Calcium Chloride. CaCl_2 . This is prepared by dissolving the hydroxide or carbonate in hydrochloric acid and crystallizing. This salt is considerably used in ice making machinery and cooling systems. It has the power of absorbing heat to a remarkable degree and, being very hygroscopic, is useful for drying gases or absorbing water from some liquids as ether, carbon disulphide etc.

Calcium Fluoride. CaF_2 . This salt occurs native and is known as **fluor-spar**. It may also be prepared by acting upon lime with hydrofluoric acid.

Calcium Glycerinophosphate. **Neurosin.** This may be prepared by adding calcium carbonate to a solution of glycerinophosphoric acid until neutralized, then concentrating and crystallizing. See Glycerinophosphates. Part II.

Calcium Hippurate. A white, crystalline powder prepared by the action of hippuric acid upon calcium carbonate, in the same manner as in making calcium benzoate. Soluble in 27 parts of water. Used as a uric acid solvent and anti-rheumatic. Dose 5 to 20 grains.

Calcium Hydroxide. Ca(OH)_2 . This is commonly known as slaked lime and is prepared by adding a small quantity of water to quicklime, which causes the latter to crumble with development of much heat. This is much used in making mortar for plastering, brick laying and masonry. It is mixed with sand and water, the lime acting upon the silica and making a gelatinous compound which adheres. Cement which is now so extensively used for building purposes is a mixture of lime 50 to 60 percent., silica 25 percent., and alumina about 10 percent., and burning them together. Most cement is made, however, from naturally deposited materials having about these proportions, and generally associated with some other ingredients. The burned ingredients are ground to a powder which, when mixed with water, solidifies to hard stone.

Calcium Hypophosphite. This is official in U. S., Br. and several European pharmacopœias. A description and formula will be found in Part II.

Calcium Iodate. $\text{Ca2IO}_3 \cdot 6\text{H}_2\text{O}$. By gradually adding a filtered solution of chlorinated lime to an alcoholic solution of iodine, and when the solution is colorless, acidulating with a little hydrochloric acid, boiling, filtering and crystallizing.

Calcium Iodide. CaI_2 . By dissolving slaked lime in hydriodic acid, until neutralized then concentrating and crystallizing. This salt is considerably used as an alterative in doses of $\frac{1}{8}$ to 2 grains.

Calcium Lactate. By adding slaked lime to lactic acid until neutral, then concentrating and crystallizing.

Calcium Lactophosphate. By adding slaked lime to a mixture of equal parts of lactic and phosphoric acid until neutral, then evaporating and crystallizing.

Calcium Nitrate. By adding slaked lime to warm nitric acid until saturated then cooling and crystallizing.

Calcium Oxide. CaO . Commonly called quick-lime, or unslaked lime, is prepared by burning limestone or marble. It is furnished by manufacturers usually in lumps but sometimes in powdered form. It requires the heat of the electric furnace for its fusion and calcium carbide is a by-product of its union with carbon in the electric furnace. When heated with oxy-hydrogen flame it gives an intense white light, known as the calcium light; by exposure to air and moisture it becomes "air slaked" and crumbles gradually to a fine powder.

Calcium Peroxide. **Gorit.** This is a recent calcium compound recommended as an antacid and disinfectant in acid dyspepsia and diarrhoeas, also as an application in diphtheria. Dose 3 to 10 grains per day according to age.

Calcium Permanganate. **Monol.** **Acederol.** By neutralizing permanganic acid with calcium carbonate, evaporating and crystallizing. It is used as an intestinal disinfectant and a cleansing application to ulcers, sore mouth etc. Dose $\frac{1}{2}$ to 2 grains.

Calcium Phosphate. $\text{Ca}_3(\text{PO}_4)_2$. This is official in the U. S., Br. and most European pharmacopœias. For description and formula see Part II.

Calcium Phosphide. This may be prepared by calcining the shells of mollusks, clams, oysters etc., and reducing to a powder. When freshly prepared it may be made into a luminous paint that will shine in the dark. Used for faces of clocks, signs etc.

Calcium Saccharate. **Antacedin.** This is an amorphous, white powder, soluble in water, and is used as an antacid and zymotic, and as an antidote in poisoning by mineral acids. Dose 30 to 120 grains or more.

Calcium Salicylate. To a hot concentrated solution of salicylic acid add slaked lime until neutralized, then allow to cool and crystallize.

Calcium Sulphate. $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. This is found abundantly in nature, and is known as **gypsum**. When calcined, $2\text{H}_2\text{O}$ is driven off, and when ground this is known as **calcined plaster**, **plaster of Paris**, or **dentist's plaster**.

Calcium Sulphides. With sulphur calcium forms several sulphides, as follows:

Calcium Sulphide may be prepared by heating gypsum with charcoal; it has the property of shining or emitting light in the dark after being exposed to sunlight, but seems only to have this property when it contains traces of some other element.

Calcium Bisulphide. CaS_2 . By boiling slaked lime and sulphur, equal parts, in water until a solution is obtained, filtering, concentrating and crystallizing.

Calcium Oxysulphide. By mixing 1 part of sulphur with three parts of slaked lime and 5 parts of water, and boiling until a portion dropped upon a slab will solidify.

Calcium Pentasulphide. CaS_5 . By using double the quantity of sulphur as for the former, and continuing the boiling longer.

Calcium Sulphite. CaSO_3 . By mixing concentrated solutions of sodium sulphite and calcium chloride, and collecting, washing and drying the precipitate.

This preparation has had a large sale formerly under the name **sulphite of lime**, as a preservative for cider.

Calcium Sulphocarbolate. Mix 3 parts of sulphuric with 7 parts of carbolic acid, warm the solution and add slaked lime until the solution is neutralized, then cool and crystallize.

Calcium Tungstate. This is a salt of tungstic acid and calcium. It is used for X-ray screens.

CARBON.

Sym. C; at. wt. ($\text{O}=16$) 11.9; sp. gr. varies as to allotropic form, diamond 3.50 to 3.55, graphite 2.09 to 2.23, amorphous 1.5 to 2.3; infusible, vapor density undetermined; quadrivalent.

Carbon may unite at very high temperature directly with many of the elements forming *carbides*; at ordinary temperatures it unites only with fluorine, forming carbon tetrafluoride, CF_4 .

It is one of the most important and widely distributed of the elements. It is the chief constituent of coal and all fuels; of oils, either mineral, vegetable or animal; of all hydro-carbon compounds and gases, of all carbonate earths and minerals; is found in many mineral waters and is present in the atmosphere near the surface of the earth. It is a constituent of all vegetable and animal substances, either living or dead, and is present in all alkaloids and neutral principles of plants and animals, its compounds including the greater part of the substances most valuable in medicine and pharmacy. Owing to its presence in all organic compounds it is, very properly called, the "organic element." In the periodic arrangement of the elements it is the first member of Group IV, Series 2. It occurs in nature in three allotropic forms.

The exact number of atoms contained in the carbon molecule has not, as yet, been determined, as different forms seem to have a different number. It is supposed that amorphous carbon has the least, graphite more and the diamond a still greater number since, in the order named, they increase in density and are less easily acted upon by reagents. It is quite certain that the molecule contains at least 12 atoms, and some combinations lead to the conclusion that as the temperature rises carbon develops a greater number of atoms in its molecule.

Carbon unites with hydrogen, chlorine, nitrogen and oxygen forming a considerable number of gaseous compounds which will be considered elsewhere. It also forms liquid compounds with sulphur, (carbon disulphide), with chlorine, (carbon tetrachloride) and with cyanogen, (prussic acid) and its "acid" (carbon dioxide) unites with a very great number of bases, which will be considered elsewhere.

Forms of Carbon.

Diamond. A crystalline form proven by Lavoisier in 1772 to be pure carbon. He burned a diamond in air, carbon dioxide resulting from the combustion. In 1814 Davy proved that when a diamond was burned nothing but carbon dioxide gas was found. In 1890 Krause demonstrated that when a diamond was burned gas was produced, which, absorbed by sodium hydroxide formed soda, identical in every respect with ordinary soda. It has also been possible to manufacture diamonds from amorphous carbon but, so far, the operation has not been sufficiently successful to warrant commercial production. The origin of the word diamond is from the Greek word *adamas*, meaning unconquerable, adamant and adamantine are from the same root-word.

Graphite. Commonly called *plumbago* or black lead. This is another form of crystallized carbon, which, although having the same chemical composition as the diamond differs from it altogether in physical characteristics, being black, soft and a good conductor of heat and electricity. It is found chiefly native in Ceylon and Siberia and is extensively used in the manufacture of lead pencils, crucibles, lubricants, stove polishes, electrical conductors etc.

It is now artificially prepared by subliming amorphous carbon at an intense heat in the electric furnace. A large factory for this purpose and for making articles from graphite is in successful operation at Niagara Falls.

Amorphous Carbon. This occurs in a great variety of forms; lampblack, charcoal, both wood and animal (bone-black), coke and many other substances are forms of amorphous carbon extensively used in the industrial arts.

Charcoal, Coal and Coke. Wood charcoal is produced by causing wood, in large piles, in a charcoal pit, covered closely with sod, to burn or smolder in absence of air until it has lost its gaseous constituents and its cellulose is converted into carbon. This is the old way of making charcoal, but since the production of wood alcohol has become common the wood is heated in iron retorts, causing dry distillation, the vapors being collected and utilized for making acetic acid, wood alcohol etc., and the charred residue being used as charcoal for the manufacture of gun powder, and for other purposes.

Animal charcoal is prepared from bones by dry distillation, the empyreumatic products being known as bone oil and bone spirit and the charred residue as bone-black or ivory black, much used for making blacking for shoes and as a pigment, but more especially in refining sugar and petroleum products to decolorize and deodorize.

Coal in all its forms results from the slow decay of plant remains in the absence of air. The plant remains consist chiefly of cellulose, C 50% H 6% and O 44%, being covered with soil or earthy matter and preserved from contact with the air, gradually decomposes losing carbon dioxide and methane, the residue becoming richer in carbon and poorer in hydrogen and oxygen. Peat is the youngest formation, and consists of C 60, H 5.9, O 34%; then comes lignite, or brown coal, C 67, H 5.8, O 27.2%; the various soft coals varying considerably in composition; then cannel coal, C 85.8, H 5.8, O 8.3%; and last anthracite coal, C 94, H 3.4, O 2.6%.

During the slow process of transformation the coal bodies have, probably, been subjected to heat and great pressure by superimposed earthy matters or rock which have been deposited over them.

Coke. This is the residue left in the retorts at gas factories after the dry distillation of soft coal in the production of illuminating gas, or, the solid product from the smothered burning of coal in coke ovens, the process being similar to that for making wood charcoal in charcoal pits. Gas residue coke is considerably used as fuel and oven coke very extensively used in metallurgy and electrical appliances.

Carbon Compounds.

Besides its combination with sulphur, which is official, carbon combines with chlorine in several proportions, with oxygen in two proportions, and with hydrogen in many proportions, forming a series of important radicals.

Carbide. This name is given to any compound of carbon with one of the more positive elements, as calcium carbide; **carburet** is a term formerly used for a compound of this nature; **carburetted** is a term used to denote a gaseous compound of carbon, as carburetted hydrogen.

Carborundum. SiC_2 , is another product of the electric furnace that has come into extensive use as an abrasive; this is also produced in large quantities at Niagara Falls, under the Acheson patents.

Carbon Chloride. A chlorine of carbon is obtained from its sesqui-chloride by subliming it repeatedly through a tube filled with small fragments of glass heated to redness. It is a transparent aromatic liquid. **Carbon Sesqui-chloride**, C_2Cl_6 , is obtained by exposing Dutch liquid with chlorine in a glass vessel to the direct rays of the sun, and renewing the chlorine as long as it is absorbed. The liquid is thus converted into a white, crystalline volatile solid.

Carbon Oxychloride, COCl_2 , is a gas made by mixing equal volumes of carbonic oxide and chlorine and exposing them to the rays of the sun.

Carbon Tetrachloride. CCl_4 . This is produced by the union of Carbon and chlorine at a high temperature. It has come into considerable prominence as a solvent for grease, and as an article for cleaning clothes. It is a liquid like carbon disulphide but of specific gravity nearly as great as chloroform. It will not take fire and from this property is greatly preferable to carbon disulphide, acetone, ether, alcohol, benzine, or any other liquid used for cleaning. It may be used in medicine as a solvent for oils or as a refrigerant for external use.

Carbon Disulphide. CS_2 . This is the only official chemical compound of carbon having a chemical title. It is produced by the union of carbon and sulphur at high temperatures.

Carbon Hydrides. With hydrogen, carbon unites in many proportions, forming a series of radicals known as the **hydro-carbon series**, or alcohol radicals. Beginning with methane or marsh-gas, CH_4 , this series increases by CH_2 forming the radicals ethyl or ethane, C_2H_6 ; propyl or propane, C_3H_8 ; butyl or tetraene, C_4H_{10} ; amyl or pentane, C_5H_{12} etc. In pharmacy these radicals are the bases of very important preparations, which are extensively used.

Carbon Oxides. With oxygen carbon forms two well known combinations, **carbon monoxide**, CO ; and **carbon dioxide**, CO_2 .

Carbon Monoxide. CO . This is produced when carbon is burned in an insufficient supply of oxygen, or may be made by passing carbon dioxide over charcoal heated to redness, then washing the gas through milk of lime to remove carbonic acid. It burns, uniting in the air with oxygen and forming carbon dioxide.

Carbon Dioxide. CO_2 . Carbonic anhydride, more commonly called "carbonic acid." This gas is produced by the union of carbon with oxygen, as in fermentation and other natural operations. It is present to a small extent in the atmosphere, from which it is absorbed and converted into plant food and the carbon of vegetation. It is abundant in the carbonate earths, and may be obtained by adding acids to them and collecting the gas which is liberated. It is the gas that gives the sparkle to champagne and soda water.

Carburetted Hydrogen. This is the name applied to two of the compounds of carbon and hydrogen, namely, **light carburetted hydrogen**, CH_4 , methane, marsh-gas or fire-damp; and **heavy carburetted hydrogen**, C_2H_4 , olefiant gas or ethylene.

True Carbonic Acid. H_2CO_3 . This acid forms with bases the very important class of salts known as **carbonates**. It has not been satisfactorily obtained as a free acid but is known to exist by the action of carbon dioxide on basic radicals in the presence of water.

CERIUM.

Sym. Ce; at. wt. ($\text{O}=16$) 140.25; sp. gr. 6.68; melts at red heat; oxidizes in moist air; may readily be ignited by scraping it with a knife; quadrivalent.

One of the so-called, rare earths, occurs principally in *cerite*, found in Sweden and Greenland; cerium is also found in the U. S., Canada and Brazil in monazotic sand, which consists chiefly of Ce, La, Di, Y and Er, with some proportion of thorium compounds. In periodic arrangement it is in Group IV, Series 8.

Cerium was isolated by Berzelius and Hisinger, in 1801. The metal looks like iron and is permanent in air, but takes fire at elevated temperatures. Its oxide has been extensively used in making mantles for incandescent gas-lights. It forms two sets of salts with oxygen; cerous salts, derived from the oxide Ce_2O_3 are colorless, and ceric salts derived from CeO_2 , which are yellow or brown. In medicine cerium oxalate is official in the U. S. P. Cerium chloride, nitrate and sulphate are also prepared, but are not official.

Salts of Cerium.

The following are the only compounds of importance:

Cerium Chloride. CeCl_3 . Prepared by burning cerium in chlorine gas and collecting the residue.

Cerium Nitrate. $\text{CeNO}_3 \cdot 2\text{H}_2\text{O}$. This is made by dissolving ceroso-ceric oxide by nitric acid in the presence of alcohol. This being soluble, is the important cerium preparation which in combination with solution of thorium nitrate, is used to prepare the mantles for incandescent gas lights, cloth forms being dipped in the mixed solutions, which, when burned, leave the skeleton mantle.

Cerium Oxalate. This is the one official salt of cerium. The method of preparing it and its uses will be found in Part II.

Cerium Oxides. When cerium is burned in the atmosphere or with oxygen it forms oxides under varying conditions as follows: Cerous Oxide, Ce_2O_3 ; Ceric Oxide, CeO_2 . By igniting cerium oxalate in an open vessel Ceroso-ceric Oxide, Ce_3O_4 , is formed.

Cerium Sulphate. $\text{Ce}_2(\text{SO}_4)_3$. This is prepared by dissolving cerium oxide in sulphuric acid, evaporating and crystallizing.

CHLORINE.

Sym. Cl; at. wt. ($\text{O}=16$) 35.46; sp. gr. (air=1) 2.45; monatomic; 1 liter weighs 3.208 grams at 0°C . and 760 mm. pressure; becomes liquid at -34°C . at ordinary pressure; solidifies at -102°C .; boiling point, liquid, -33.6°C .

Liquid and solid chlorine are yellow, the gas is yellowish-green, from which characteristic its name is derived from the Greek. It has a disagreeable, suffocating odor. It is soluble in about one-half its volume of water the solution being known as chlorine water. The most convenient way to gather chlorine gas is to conduct it into a bottle standing upright, being heavier than air it displaces it and shows by the color when the bottle is filled.

Chlorine does not occur free in nature because of its combination with most all chemical elements at ordinary temperatures. It may be prepared by electrolysis of hydrochloric acid or by heating hydrochloric acid with manganese dioxide in a flask and collecting the gas. In periodic arrangement it is in Group VII, Sub-group B., one of the halogens, having characteristics similar to fluorine bromine and iodine.

Chlorine was discovered by Scheele in 1774, who supposed it to be an oxygen compound of hydrochloric acid; Berthollet, in 1885, named it oxygenized muriatic acid; Kirwan a little later termed it oxymuriatic acid; Gay-Lussac, in 1809, denied that it contained oxygen and proved it to be an element and Davy, in 1810, confirmed his statements and gave the element its name, *chlorine*, on account of its greenish-yellow color.

It combines with most of the elements at ordinary temperatures and is so energetic that its action is highly corrosive; it discharges vegetable colors and for that reason is extensively used as a bleaching agent; it also destroys noxious effluvia and is therefore greatly used for disinfecting and deodorizing purposes. Its most important compound is with hydrogen, forming hydrogen chloride or hydrochloric acid, which combines with most bases and radicals and forms a large number of salts much used in the arts and industries and in medicine. The only pharmaceutical preparation in which uncombined chlorine is used is chlorine water, which is simply a solution of chlorine gas.

Chlorine Compounds.

Hydrogen Chloride. With hydrogen, chlorine forms hydrogen chloride, HCl , which is real hydrochloric acid. Equal volumes of each gas unite, forming two volumes of a colorless gas having a sharp, suffocating odor. Its critical temperature is 52.3°C . and the critical pressure 86 atmospheres. Liquid hydrogen chloride boils at -83.7°C . and the solidified compound melts at -111.1°C . The sp. gr. of the gas (air=1) is 1.2696; 1 liter weighs 1.653 grams at 0°C ., 760 mm. pressure. Very soluble, 1 vol. of water at 0°C . being capable of absorbing 503 vols. The solution of this gas in water is the hydrochloric acid of commerce.

Oxygen Compounds. All of the oxygen compounds of chlorine are unstable and most of them are explosive.

Chlorine monoxide, Cl_2O , may be prepared by passing chlorine over red precipitate, HgO , and cooling the condensed product. It is a reddish-brown liquid boiling at 21°C ., very unstable and explodes when heated, dissolves in water forming HClO ; $\text{H}_2\text{O} + \text{Cl}_2\text{O} = 2\text{HClO}$.

Hypochlorous acid, HClO , may be prepared by passing chlorine over hydroxides of the alkaline earths at cool temperatures. Hypochlorites are formed and the acid may be obtained from them in aqueous solution; also calcium hypochlorate (chlorinated lime) may be distilled with dilute nitric acid. This is a very efficient bleaching compound. Chlorine trioxide, Cl_2O_3 , and chlorous acid, HClO_2 , are supposed to exist as oxygen combinations.

Chlorine tetroxide, Cl_2O_4 and ClO_2 , are produced by treating potassium chlorate with concentrated sulphuric acid and by other processes. It is soluble in cold water and crystallizes at a low temperature. Its vapor explodes on contact with organic substances.

Chloric acid, HClO_3 , and perchloric acid, HClO_4 , are other oxygen compounds, the latter being more stable than any of the others.

Chlorine is known to form compounds with every element but fluorine. Its combination with other elements being known as chlorides and its combinations with oxyacids uniting with bases to form chlorates and perchlorates. The compounds of chlorine other than with hydrogen and oxygen are generally noticed under the name of the element with which it combines.

CHROMIUM.

Sym. Cr; at. wt. (O=16) 52.0; sp. gr. 6.81; very difficultly fusible; melts only in the electric furnace, in which Moissan reduced the oxide in 1894. Goldschmidt's method, which is now preferred, is to fuse chromium oxide with aluminum filings, when, if excess of chromium oxide is present the pure metal is obtained, being lustrous, of a dark iron color and taking a fine polish.

The element with oxygen is trivalent, with other elements may be bivalent, quadrivalent or sexivalent. In the periodic arrangement it is in Group VI, having characteristics like molybdenum, tungsten and uranium.

Chromium was discovered by Vauquelin, a French chemist, in 1797, and derives its name from the Greek word signifying colors, in allusion to the bright colors of many of its compounds. It is the cause of the color of green serpentine, the emerald and chrome garnet and forms with metals many colors used as pigments; as lead chromate, PbCrO_4 , chrome yellow, which is also the basis of chrome green by mixture with prussian blue etc. Chrome alum which is a double salt of potassium and chlorine is extensively used as a mordant in dyeing and in tanning, chromium having the property of fixing colors and making gelatine insoluble. Chromium forms three series of compounds.

Chromium Compounds.

Chromous in which the element acts as a dyad—these compounds are all unstable.

Chromic in which it unites as a tetrad.

Chromate in which it unites as a hexad.

Chromium Sulphate. $\text{Cr}(\text{SO}_4)_3$. This is a compound produced by treating the metal chromium with concentrated sulphuric acid and crystallizing. It occurs as dark green scales, which are soluble in water. It has recently been recommended for neurasthenia, exophthalmic goiter, and locomotor ataxia. Dose 4 to 8 grains, in the form of tablets.

Chromium trioxide, CrO_3 is the combination formerly known as chromic acid or chromic anhydride; this unites with potassium, forming bichromate, or dichromate, $\text{K}_2\text{Cr}_2\text{O}_7$, and with other bases forming chromate salts.

Chromium unites with all the halogens, bromine, forming chromium bromide, Cr_2Br_6 , chlorine, forming CrCl_3 , and iodine, forming chromium iodide, CrI_3 , and with sulphur, forming chromium sulphide; with most of the acids forming salts, and with the alkali bases by fusion with their carbonates, forming alkali chromates.

Chromium trioxide and potassium dichromate are official in the U. S. P.

COBALT.

Sym. Co; at. wt. (O=16) 58.97; sp. gr. 8.9; color pink with a high metallic luster, is magnetic, but less so than iron; melts at 1600°C .; not acted upon by air or water. In periodic arrangement it is classed with iron and nickel in Group VIII and has similar characteristics as these metals.

Cobalt was discovered by Brandt, a German chemist, in 1733; it may be obtained from its arsenic combinations, smaltite, CoAs_2 , or cobalt glance, CoAsS , by calcining them and reducing the resulting cobalto-cobaltic oxide, Co_3O_4 , with carbon or hydrogen. It unites readily with nitric acid forming cobaltic nitrate, but is only slightly affected by hydrochloric and sulphuric acids.

Cobalt Salts and Compounds.

Cobaltic Oxide. Co_2O_3 . This is prepared from the nitrate by ignition. It is a black powder, but when heated to a white heat changes to a white powder, cobaltous oxide.

Cobaltous Chloride, $\text{CoCl}_2 \cdot \text{CH}_2\text{O}$, is a red, crystalline salt. Its solution is used for saturating barometer paper, which when dried turns blue, but in the presence of moisture in the atmosphere changes the color to pink.

Cobaltous Nitrate, $\text{Co}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$, is in red, hygroscopic prisms.

Cobalt Sulphate, $\text{CoSO}_4 \cdot 7\text{H}_2\text{O}$, is in dark-red, monoclinic prisms. It forms double salts with alkaline sulphates.

The acetate, chloride, nitrate and sulphate salts in solution may be used for preparing sympathetic inks, with which writing is invisible until moistened and heated, when it plainly appears.

"Cobalt" which is sold in the stores as fly poison is a native ore containing arsenic, upon which its poisonous qualities depend.

Some of the cobalt salts are used for coloring glass, especially cobalt silicate, which is a very deep blue. When coarsely powered, this compound is known as *smalt* and is used in painting signs.

None of the cobalt salts are employed in medicine.

COLUMBIUM. (Niobium).

Sym. Cb; at. wt. (O=16) 93.5; sp. gr. 7.06. A rare metal usually found associated with tantalum in columbite and other rare minerals. Allied with nitrogen and phosphorous in properties and proportion in its compounds. The metal is of a steel-gray color, burns in air, is insoluble in hydrochloric acid or aqua regia, but is soluble in hot concentrated sulphuric acid. In periodic arrangement it is classed in Group V, having similar characteristics as vanadium and tantalum. It combines as a triad and as a pentad.

Columbium was discovered by Rose, an English chemist, in 1846. It is now chiefly obtained by heating niobic acid with sugar charcoal in the electric furnace. It resembles silicon more than the metals. It is not soluble in acids, but with chlorine forms a volatile chloride which is decomposed by water, fluoride and double fluoride are formed with fluorine. With oxygen it forms an oxide and dioxide, both black powders, and a pentoxide, white when cold, yellow when hot. With potassium its oxides form double salts or alums. It has no use in medicine.

COPPER. (Cuprum).

Sym. Cu; at. wt. (O=16) 63.57; sp. gr. 8.94; bivalent, crystallizes in cubes. Melts at 1045°C.; malleable and ductile; may be rolled into thin sheets or hammered into foil, imitating gold leaf, but thicker; and may be drawn into wire, of which great quantities are used especially for conducting electricity on trolley, telegraph and telephone lines and electrical instruments. It occurs native in America, China, Japan and some other countries, and in ores and mineral combinations, throughout the world. It is not affected by dry air at ordinary temperatures, but when heated in air forms copper oxide, CuO. It unites with nitric acid, but is not affected by dilute hydrochloric acid. At ordinary temperatures it is not acted upon by sulphuric acid, but it reacts at a higher temperature giving off sulphur dioxide gas. With ammonia and oxygen it dissolves, producing copper oxide ammonia, a blue liquid; solutions of salts are precipitated or deposited by iron, magnesium and several other metals. In periodic arrangement it is in Group I, associated with silver and gold and having like characteristics.

Copper is a pre-historic metal. It forms alloys with a considerable number of the metals, with aluminum forming white bronzes; with zinc, the well known metal brass; with tin the antique bronzes, containing also a little lead and zinc; with tin alone, gun-metal and bell-metal; with tin phosphite, phosphor bronze, and silicon bronze, using silicon instead of phosphorus, and forming a very hard firm metal used for bearings and otherwise.

The metal copper is very extensively used in the industrial arts, and for a great number of purposes. It is now extensively produced by electrolysis, and as a by-product in mining gold and silver.

Copper forms two sets of salts, by the reaction of its two oxides, cuprous oxide, Cu₂O, and cupric oxide, CuO. These salts will be noted under "Cuprum" in Part II. Copper sulphate is the only salt official in the U. S. P.

Copper Alloys.

The following formulas show the composition of some of the principal alloys into which copper enters:

Brass. Copper and zinc combine in all proportions to form brass, which varies in color according to the proportions of the metals.

Prince Rupert's Metal, Pinchbeck and Mannheim Gold contain 75 to 80 percent, of copper, and are considerably used for making cheap jewelry.

Tombac contains 84.5 percent. of copper and 15.5 percent. of zinc. It is used for making "Dutch metal," an imitation of gold leaf; used extensively for cheap work.

Casting brass varies in composition as required for different purposes, but the usual proportion is about 70 percent. of copper with 30 percent. of zinc. Other metals are sometimes added in small proportions.

By lacquering brass with various kinds of lacquer it is made to imitate bronze.

Bronze. This is made from copper and tin in varying proportions. It is used in making statuary and many other articles. Varieties of bronze known as bell metal, which is composed of about 78 parts of copper to 22 parts of tin, and gun metal, which contains 90 parts of copper and 10 of tin. The ordinary casting bronze contains from 80 to 85 percent. of copper, 15 to 20 percent. of tin, and 1 to 2 percent. of zinc.

Phosphor Bronze contains phosphorus, and is used for making ordnance and for other purposes.

Gold Bronze is brass or bronze in very fine powder; used as a substitute for gold in gilding and for printing and decorations.

German Silver or Nickel Silver. This is a white metal, much employed as a basis for plated ware and ornamental artistic work. It is composed of copper, nickel and zinc in varying proportions, to which other metals are frequently added. The average proportion for spoons, forks etc., is 2 parts of copper, 1 of nickel, and 1 of zinc. For other purposes, larger or smaller proportions of the metals are used.

Tempered copper is now made by a secret process, and from it cutting implements are now made, and other articles in which hard copper may be desired.

Salts of Copper.

In pharmacy the salts of copper are considerably used for various purposes, and in medicine they are somewhat employed in solutions, ointments and plasters for external uses, but seldom internally.

The following are the more common salts of copper. Several of the copper salts were formerly official in the U. S. and Br. pharmacopœias, but now copper sulphate is the only official salt.

Copper Acetate. $\text{Cu}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot \text{H}_2\text{O}$. This is most conveniently prepared by precipitating a concentrated solution of lead acetate with copper sulphate, then filtering the solution, evaporating and crystallizing. This is called Normal Cupric Acetate, to distinguish it from Basic Cupric Acetate, or Verdigris, which is a mixture of several copper acetates. It is used in some plasters and ointments.

Copper Ammoniate. $\text{Cu}(\text{NH}_3)_4 \cdot \text{SO}_4 \cdot \text{H}_2\text{O}$. This salt was formerly official. It is made by rubbing together in a mortar 240 grains of copper sulphate and 360 grains of ammonium carbonate until effervescence ceases, then collecting the salt and pressing in bibulous paper.

Copper Arsenate. $\text{Cu}_3\text{As}_2\text{O}_8$. By adding a solution of copper sulphate to a solution of sodium arsenate, then collecting and drying the precipitate.

Copper Bromide. CuBr_2 . By dissolving copper oxide in hydrobromic acid, evaporating and crystallizing.

Copper Carbonate. CuCO_3 . By adding a solution of sodium carbonate in excess to a solution of copper sulphate and warming. This is a green pigment.

Copper Chloride. CuCl_2 . By dissolving copper scraps in hydrochloric acid, evaporating the solution and crystallizing.

Copper Citrate. By heating a solution of copper acetate with citric acid and crystallizing.

Copper Nitrate. $\text{Cu}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$. This salt is official in the Br. but not in the U. S. pharmacopœia. It may be made by dissolving copper in nitric acid diluted with water, evaporating the solution and crystallizing.

Its solution makes a permanent blue for show bottles.

Copper Oxide. Copper Suboxide. Cuprous Oxide. Cu_2O . By igniting copper in fine powder in the atmosphere, or by precipitating a solution of copper sulphate with grape sugar and caustic potassa, collecting and drying the precipitate.

Copper Oxide. CuO . By heating the copper nitrate or carbonate to redness, and continuing the heat until it remains a black heavy powder.

Copper Sulphate. $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$. This salt is most commonly known by the name of Blue Vitrol or Blue Stone. It is the most used of any of the copper salts, and may be conveniently made by dissolving scraps of copper in sulphuric acid diluted with water, by the aid of heat, then evaporating the solution and crystallizing.

It is considerably used in batteries for generating electricity, for coloring and dyeing purposes, and in medicine for making various cleansing washes, liquids etc. It is sometimes given as an astringent in doses of $\frac{1}{4}$ to 2 grains, and as a quick emetic in doses of from 5 to 10 grains.

Dried or anhydrous copper sulphate is made by heating copper sulphate until its water of crystallization is vaporized, then reducing it to a powder. It is used as a test for alcohol and as an escharotic.

Many other salts of copper are formed with other acids, but they are unimportant.

DYSPROSIUM.

Sym. Dy; at. wt. ($\text{O}=16$) 162.5. This rare element is for the first time included in the International list of elements, but has not yet been assigned a place in the periodic arrangement.

ERBIUM.

Sym. Er; at. wt. ($\text{O}=16$) 167.4. An element found in the rare minerals, gadolinite, euxenite, keilhauite and samarskite which contain a mixture of earths closely resembling glucina. Several of the rare elements are contained in this mixture of earths and it is very difficult to obtain either the elements or their oxides, but they have been disassociated by the spectroscope and assigned names and atomic weight and classed in the periodic arrangement of the elements, erbium being in Group VI. But little is known of this rare element except that it was discovered by Mosander, a Swedish chemist, in 1843, and assigned a name and has recently been listed in the elements.

EUROPIUM.

Sym. Eu; at. wt. 152.0. This element has been recently introduced in the International list of Elements, but has not yet been assigned a place in periodic arrangement.

FLUORINE.

Sym. F; at. wt. ($\text{O}=16$) 19.0; sp. gr. of the gas compares with its atomic weight 19, ($\text{O}=16$) of the liquid fluorine 1.14 (water =1).

This gaseous element has a color similar to chlorine, but lighter, and has a penetrating, pungent odor. In liquid form it boils at -187°C . and has a bright yellow color. Although glass is instantly attacked by hydrofluoric acid, pure fluorine gas or liquid does not affect it, and it may be condensed in glass vessels. It freezes to a white mass when cooled by liquid hydrogen and melts at -223°C . The molecule of fluorine is diatomic (F_2). In periodic arrangement fluorine is in Group VII, at the head of the halogens.

Flourine was discovered by Ampère in 1810, but was first isolated by Moissan in 1886, who obtained it from fluoric acid by electrolysis. It is the most energetic element known, but does not combine with oxygen even at very high temperatures. With most metals it combines violently and with great rapidity, carbon ignites at once in fluorine gas, and alkali metals and earths burn in it at ordinary temperatures, iron in filings glows in the gas and copper is soon covered with a layer of copper fluoride, but gold and platinum are unaffected by it. In nature it occurs in great quantities combined with calcium, in the rocky formation fluor spar, CaF_2 , and with aluminum and sodium as cryolite, $\text{Al}_2\text{F}_6 \cdot 6\text{NaF}$.

Hydrogen Fluoride, or Hydrofluoric Acid. HF. This is the most important chemical compound of fluorine. It was discovered by Scheele in 1771, who prepared it by heating together fluor spar and sulphuric acid. This compound must be heated in platinum or lead as glass is instantly acted upon by it and the acid must be preserved in lead or gutta percha bottles instead of glass. This acid is used chiefly for etching on glass, and either the solution in water or the gas itself may be employed.

Other chemical compounds of fluorine are seldom required.

GADOLINIUM.

Sym. Gd; at. wt. (O=16) 157.3; trivalent. One of the rare elements found in the mineral gadolinite; discovered by Marignac, a French chemist, in 1886, and named by him for the Russian chemist, Gadolin. It has been included in the International atomic list, and assigned a place in the periodic arrangement of group III, in company with other elements obtained from rare minerals. Otherwise but little is known about it.

GALLIUM.

Sym. Ga; at. wt. (O=16) 69.9; sp. gr. 5.9; trivalent; melts at 30°C.; is oxidized on the outside by air, the oxidation preventing further action; is not acted upon by water. It is a very rare element belonging to the aluminum family, Group III, Series 5 of the periodic arrangement.

Gallium was one of the elements predicted by Mendelejeff—the hypothetical eka-aluminum—which was afterwards discovered by Boisbaudran in 1875, in zinc blend from the Pyrenees, by spectrum analysis. Sixty-two grams of this element prepared from 2400 kilogrammes of this mineral, was exhibited at the Paris Exposition of 1878. It is a bluish-white metal resembling mercury, and when heated at 30°C. it remains liquid, if undisturbed, for several weeks, even at 0°C. If, however, it is touched with a fragment of the solid metal the liquid crystallizes at once. It dissolves readily in dilute hydrochloric acid and in solution of alkali, with evolution of hydrogen, showing its intimate relation to aluminum. The sulphate also forms double salts, alums; with ammonia. It has no medicinal value.

GERMANIUM.

Sym. Ge; at. wt. (O=16) 72.5; sp. gr. 5.47 at 20°C.; quadrivalent; melts at 900°C.; is unaffected by air at ordinary temperatures; is converted at red heat into germanium oxide, GeO_2 . It is insoluble in hydrochloric acid but is acted upon by chlorine and by nitric acid and forms compounds with fluorine and sulphur and dissolves in melted alkalis. It is in Group IV of the periodic arrangement having characteristics similar to silicon and tin.

Germanium is a rare element; it was predicted by Mendelejeff while still unknown and its place assigned in his periodic table under the name of "eka-silicon." It was discovered some time afterwards by Winkler, a German chemist, in *argyrodite* a mineral found in Saxony and he gave it the name of germanium.

It forms two series of compounds corresponding to its oxides, germanious oxide, GeO , and germanium dioxide, GeO_2 , also germanium sulphide, GeS , and germanium disulphide, GeS_2 .

Its compounds are not used in medicine.

GLUCINUM.

Sym. Gl; at. wt. (O=16) 9.1; sp. gr. 1.64; bivalent. This has already been described under the heading Beryllium, by its name now quite generally known in chemistry, but in the International List it is now called Glucinum.

GOLD. (Aurum).

Sym. Au; at. wt. (O=16) 197.2; sp. gr. 19.3; average; melts at 1064°C.; univalent and trivalent; color reddish-yellow; very malleable and ductile. Occurs native in all countries, free, in the form of nuggets, or in grains or

very fine powder in alluvial deposits, gravel and sand, in quartz rock, ores, and combined with other minerals or elements, is also found in solution in seawater and some mineral springs. In periodic arrangement it is in Group I Series 11, having characteristics like copper and silver.

Gold is a pre-historic metal and in all historic time has been known as a noble or precious metal. It is not acted upon by the simple acids, but is dissolved by nitro-hydrochloric acid (aqua regia), and in chlorine solution (chlorine water), forming unstable compounds which, when heated, decompose leaving the metal; also by electrolysis it forms a colloidal solution. It forms alloys with a number of the metallic elements, especially with copper and silver. Gold coinage of the U. S. is an alloy of 1 part copper with 9 parts of gold; England gold money is an alloy of 1 part of copper with 11 parts of gold. Silver is used as an alloy with gold for many purposes.

Pure gold is too soft for coinage or for jewelry, but is used for making gold foil for filling teeth and for gold leaf. The pure metal is called 24 kareet (carat) gold, jewelry is made from 18 to 12 kareets fine, and other alloys are sometimes used. Gold plating is done by electrolytic processes similar to silver plating and for some purposes a thin layer of gold is rolled upon other metal, this product being called "rolled gold."

Free or uncombined gold forms an amalgam with mercury and the amalgamation process is quite generally used to separate it from gravel, soil, sand, crushed rock or ores, where it occurs in this form. The amalgamation is accomplished in stamp mills, in which mercury is used, or by running tailings containing auriferous slime (very fine gold, flour gold) over amalgamated copper plates to which the fine particles of gold adhere. The amalgam is afterwards treated by pressure and distillation, separating the mercury from the metals, (usually gold and silver) which are afterwards themselves separated. The treated tailings which may still retain some very fine gold are again treated by the cyanide process devised by Siemens, from 0.1 to 0.01 percent. of potassium cyanide, being added, which by oxidation by contact with the air, dissolves the gold in the solution forming a double cyanide, $\text{KAu}(\text{CN})_2$. From this solution, after standing, gold is recovered by electrolysis, using steel anodes and lead cathodes, the gold being deposited on the lead from which, being melted, the gold is separated by cupellation. For low grade ores and those containing sulphur and tellurium (the tellurides), amalgamation is not generally employed, chlorination and the cyanide process being employed instead. The chlorination process consists in roasting the crushed ore and then treating it with chlorine, by which it is dissolved. The gold is then precipitated from its chlorine solution with hydrogen sulphide, and the precipitate heated to remove its volatilizable constituents. The cyanide process is also employed on low grade ores in the manner described for treating tailings, but zinc is generally used as the precipitant instead of electrolysis. Gold forms two series of compounds corresponding to its oxides, Au_2O , aurous oxide and auric oxide, Au_2O_3 .

Aurous Oxide, Au_2O , may be prepared by treating aurous chloride with dilute potassium oxide. It is a dark violet powder, decomposing at 250°C .

Auric Oxide, Au_2O_3 , may be prepared by precipitating auric chloride with magnesia, the precipitate is then treated with concentrated nitric acid, the auric oxide remaining in the precipitate as a brown powder which decomposes at 250°C . The solution resulting from this treatment with magnesia may be further treated, with dilute nitric acid, causing a precipitate of an oxygen acid, AuO_3H_3 , known as auric acid. This acid unites with bases forming aurates.

Aurous Chloride. AuCl . This may be prepared by heating auric chloride to 185°C . It is a white salt, insoluble in water and decomposes upon being heated.

Auric Chloride. AuCl_3 . This is the basis of all the gold chemical compounds, as gold is soluble only in chlorine or aqua regia. It may be prepared by the action of chlorine gas on gold in form of powdered gold leaf, or by dissolving gold in nitro-hydrochloric acid. It forms in red crystalline

mass which rapidly deliquesces when exposed to moist air. The gold and sodium chloride of the U. S. P., which is the only official salt of gold, is prepared by mixing equal parts of the gold chloride with sodium chloride. Other salts and compounds of gold will be noted under Aurum in Part II.

HELIUM.

Sym. He; at. wt. (O=16) 3.99; boils at -267°C . at 760 mm. pressure; does not combine with other elements, therefore has no valency. In periodic arrangement it is first of the Zero group, the rare gases, and its atomic weight is the least of all the elements except hydrogen.

Helium was discovered as a constituent of the sun's atmosphere by Sir Norman Lockyer, about 1875, and was afterwards discovered as an earth element by Ramsay, who rediscovered it in the atmosphere in 1895. It was also found in small quantities in the rare mineral *cleveite* from which it was obtained by heating the mineral, the spectroscope also reveals it in some of the stars. As far as can be at present determined helium is a disintegration product of radium emanation and is a probable proof of the transmutation of matter, which was the unrealized aspiration of the alchemists. It exists in enormous quantities in the gaseous atmosphere of the sun, from which it derived its name—the sun element—and seems to be present wherever atoms of radium are broken up. It is found in the lighter portion of our own atmosphere and wherever radio-active minerals exist.

HYDROGEN.

Sym. H; at. wt. (O=16) 1.008; sp. gr. (air=1) 0.06949; weight of one liter at 0°C . 760 mm. pressure 0.0899 gram. It has been liquified, with great difficulty, in small quantities by pressure of 180 atmospheres and cold produced by the evaporation of liquid air. Its critical temperature is -241°C . at 15 atmospheres. Liquid hydrogen is colorless, and boils at -252.8°C . Dewar succeeded in freezing hydrogen to a solid by allowing liquid hydrogen to evaporate rapidly under a pressure of 30 to 40 mm. Solid hydrogen melts at about -257°C .

Hydrogen gas is inflammable. It is the lightest substance known, it dissolves at 0°C ., 2.15 volumes in 100 volumes of water and a somewhat larger proportion in alcohol. As a chemical constituent of water it is one of the most abundant elements and its combination with other elements make up quite a proportion of the ingredients of the earth, although it unites with a much less number of elements than oxygen.

It is at the head of Group I, in periodic arrangement and is the only member of Series 1 of the table. It has been supposed by some of the great chemists to be the base from which all other elements and all substances have been produced, and the idea still prevails with a large number of intelligent investigators that hydrogen is the real elemental progenitor of all material things. However that may be, the chemist has only to deal with it, at the present time as an element and an ingredient of the compounds with which it unites.

Hydrogen was discovered as an element by Cavendish, an English chemist, in 1781, and Lavoisier confirmed his discovery in 1783. The hydrogen atom H, is univalent and is the standard of quantivalence of the elements; its molecule consists of two atoms, H-H. It is a colorless, odorless gas, seldom found free in nature, but readily prepared by the action of diluted sulphuric acid on zinc or iron; the bubbles of gas that arise are hydrogen. It is very combustible and has the greatest heating or calorific power of any substance. When burned in air the vapor of water is the only combustion product.

Hydrogen Compounds.

Hydrides. Hydrogen unites with a number of the elements forming binary compounds known as "hydrides." The elements with which this unites are fluorine, chlorine, bromine, iodine, oxygen, sulphur, selenium, tellurium, carbon, silicon, nitrogen, phosphorus, arsenic, antimony and copper. Only with carbon it unites in a great number of proportions, forming hydro-

carbons; with all the others it unites chiefly in one proportion, but with a very few in two or three other different proportions. Hydrogen does not directly enter into union with any of the elements except through the action of heat or electricity, or through some intermediary by which the union may be established and with the exception of bromine, chlorine, fluorine and oxygen, it does not readily react and it is necessary to bring about the action by indirect means. The majority of the hydrides are gases, their solutions in water forming an important class of acids, as in the case of nitrogen, NH_3 , ammonia water; the carbon hydrides, form a large class of preparations much used in pharmacy and medicine, the alcohols, ethers, alkaloids etc.

Hydroxyl. HO or OH . This compound of hydrogen and oxygen is known to exist but cannot be isolated. It is a hypothetical radical formed in the transition of the hydrogen atom in its union with oxygen. Its formula may be represented as $\text{H}-\text{O}-$ showing an unsaturated atom of oxygen. It occurs as a factor in the molecules of many chemical compounds—the hydroxides—and is otherwise influential in many chemical processes but as it cannot be isolated it can only be hypothetically explained.

Hydric Oxide, (Water), H_2O . This product of hydrogen with oxygen is the most abundant and generally diffused of its compounds. When two volumes of hydrogen and one volume of oxygen are mixed, and an electric spark applied, the gases unite explosively, forming water; when a jet of hydrogen is burned under an inclined bell jar the oxygen of the air unites with it and vapor of water is produced inside the jar and runs down its sides as water. With an ordinary oil lamp, when first lighted the chimney is covered with a film of condensed water vapor which results from the combustion of a hydro-carbon in the presence of oxygen of the atmosphere. So, in many ways the union of hydrogen with oxygen, forming water, can be shown, and it is always present in the atmosphere in the form of vapor, which condenses into clouds, rain and snow. Water is necessary to all forms of life and is essential in most of the chemical reactions that take place. Its freezing point is 0°C . (32°F .), and boiling point 100°C . (212°F .), at 760 mm. pressure, that is, the average pressure of the atmosphere. Other facts concerning water will be found under the title Water in this section.

Hydrogen Peroxide. H_2O_2 . This may be considered as a double hydroxyl, ($\text{H}-\text{O}-\text{O}-\text{H}$), the molecule consisting of two atoms each of hydrogen and oxygen, while hydroxyl consists of but one atom each. Its solution is known as hydrogen peroxide, and is now much used in surgery and as a toilet requisite. The formula for preparing this will be found under the title "Aqua Hydrogenii Dioxide" in Part II.

Hydracids. The inorganic acids which are formed by the combination of hydrogen with non-metallic elements, and do not contain oxygen, are known as Hydracids. They are hydrobromic acid, hydrochloric acid, hydrofluoric acid, hydrosulphuric acid, hydriodic acid and hydrocyanic acid.

INDIUM.

Sym. In; at. wt. ($\text{O}=16$) 114.8; sp. gr. 7.42; melts at 176°C .; color white; permanent in air; at a high temperature burns with a blue flame to an oxide, In_2O_3 ; the hydroxide dissolves in alkalis; the chloride, InCl_3 is hygroscopic; the sulphate forms an alum with ammonium sulphate. Its characteristics bring it into the same periodic group as aluminum, Group III, and other properties associate it with cadmium and tin in Series 7. It is classed with gallium and thallium which are also of rare occurrence.

Indium was first discovered through the spectroscope in certain blends, by Reich and Richter, German chemists, in 1863, and a little later by Webbsky, in South American vanadium ores. It has, at present, no industrial or medicinal importance.

IODINE.

Sym. I; at. wt. ($\text{O}=16$) 126.92; sp. gr. 4.95 at 15°C .; melts at 114.2°C .; boils at 184.35°C ., 760 mm. pressure. Its color is very dark grayish, but its vapor is deep violet, and it derived its name from this characteristic. It

is slightly soluble in water but dissolves readily in alcohol, ether and chloroform; the vapor density of iodine is 8.72 (air=1) at about 600°C., but decreases with rising temperature until at 500°C. it is only 4.5. This indicates that below 600°C. its molecule consists of two atoms, but above that temperature disassociation begins. In periodic arrangement it is the last member of the halogen group, Group VII, and in Series 7, having characteristics similar to fluorine, chlorine and bromine.

Iodine was first discovered by Courtois, a manufacturer of saltpetre, in Paris, in 1812, but was first recognized as an element by Gay-Lussac in 1815. It is obtained from the ashes of sea-weed, known as kelp or varec, which is found off the western coast of the British isles and France; and also in the mother liquor left after the crystallization of Chili saltpetre, the same as bromine is found in the mother liquor after the crystallization of salt. In some sections sea-weed is now cultivated for the purpose of obtaining iodine, together with the alkalies which are obtained from its ashes.

Iodine unites directly with non metallic elements with which other halogens forms compounds, as sulphur, phosphorus, etc., and through its hydrogen combination, hydriodic acid, with most of the metals, forming iodides, and by its oxygen combinations forming iodates.

Acids of Iodine.

Hydrogen Iodide, HI, Hydriodic Acid. This compound of iodine with hydrogen is the one from which most of the iodine salts are evolved. It is a colorless gas, having specific gravity 62.94 (H=1) and when exposed to the air, gives forth fumes of acid reaction and pungent odor. Under pressure of 4 atmospheres at 0°C. it condenses to a colorless liquid; this liquid boils at -34.14°C. under pressure of 730.4 mm. The melting point of the solid acid is -50.8°C. Water dissolves 425 times its volume of gaseous HI at 10°C. This strong solution fumes, liberating iodine and gradually turning darker because of its loss.

Hydroic acid of sp gr. 1.50 and 1.70 is furnished in sealed tubes by manufacturing chemists, but the 10 per cent. solution of the hydriodic acid in water, known as diluted hydriodic acid, is the preparation generally used in pharmacy, and the only one available for pharmaceutical use.

Iodic Acid, HIO_3 . This is an oxygen acid of iodine, occurring in crystalline form. It is chiefly used for making iodate salts by combination with bases. It is also called iodic anhydride.

Periodic Acid or Anhydride. HIO_4 . By adding 1 part of iodine to 7 parts of sodium carbonate dissolved in 100 parts of water, and passing chlorine into the heated liquid until a precipitate ceases to form. Collect this precipitate, dissolve it in pure nitric acid then add silver nitrate, and dissolve the precipitate which forms in hot diluted nitric acid. Concentrate the solution and crystallize, then re-dissolve the crystals in water and re-crystallize.

Iodine Compounds.

Iodine Bromide, Iodine Chloride, Iodine Cyanide and Iodine Tri-Chloride have recently been introduced. The latter is attracting some attention as an antiseptic and antizymotic in the treatment of cutaneous diseases, gonorrhœa etc., and for internal administration for fermentative dyspepsia etc. A solution is made for external use, 1:1000, and the dose internally is $\frac{1}{8}$ grain.

Other compounds of iodine will be noted under the heading Iodum in Part II.

IRIDIUM.

Sym. Ir; at. wt. (O=16) 193.1; sp. gr. 22.42; trivalent; melts at 1950°C.; color like steel; is not affected by air, nor acted upon by acids—not even aqua regia affects pure iridium. With gaseous chlorine it forms two chlorides, perhaps three, and with oxygen three oxides, with corresponding hydrates which dissolve in acids. It is in Group VIII. Series 10 of the periodic table, associated with platinum, rhodium etc.

Iridium was discovered by Tennant, an English chemist, in 1804; it is obtained chiefly from iridosmine in which it is associated with osmium, from which it is separated by heating the ore in a current of oxygen, which vol-

utilizes the osmium, leaving the iridium. It forms an alloy with platinum, which is used in making crucibles, stills and dishes, so called platinum ware because of its being unaffected by acids and but slightly by ordinary heat, an alloy of 90 parts platinum with 10 parts iridium was chosen for making the prototype of the metre, preserved in Paris, Washington and elsewhere. Because of its hardness and negative qualities it is used for making the points of gold pens, and for many parts of delicate instruments, in which a very hard metal unaffected by chemicals would be desirable.

Iridium Chlorides. With chlorine two chlorides are formed, Ir_2Cl_6 , and IrCl_3 , both of which unite with alkali chlorides to form double salts. The tetrachloride, IrCl_4 , is a black or dark brown substance which forms an intensely red solution when dissolved in water. When added to platinum chloride solution a much deeper color results.

Iridium Oxides. The monoxide, IrO , is a black powder, the dioxide, IrO_2 , is a black insoluble powder, the trioxide, Ir_2O_3 , is black and insoluble. Iridium hydroxides, $\text{Ir}(\text{OH})_3$ is blue and $\text{Ir}_2(\text{OH})_6$ is black.

IRON. (Ferrum).

Sym. Fe; at. wt. 55.85; sp. gr. 7.84 (varies slightly according to form); is oxidized slowly in contact with air or water and unites with acids forming two sets of compounds, ferrous and ferric. Native iron is not known to occur, but meteoric iron is sometimes found, usually combined with nickel as an alloy. The chief source of iron is in various ores and combinations with oxygen, sulphur, carbon and silicon. It is the first member of Series 4, Group VIII, in the periodic arrangement, and is closely related to cobalt and nickel.

Iron is a prehistoric metal, known since the early civilization of man as the most useful of any of the metals. It was not, however, until man learned to utilize fire and invented tools to work the metal into shape that iron became useful. As an ore or in combination with other elements it was useless for any practical purpose, and it was only when reduced by fire to metallic iron that it becomes available for the use of man. The Stone Age and the Bronze Age both preceded the Iron Age. Tubal Cain forged the sword, but the plowshare was made of wood. It has not been until comparatively recent time that iron industry was developed to its wonderful proportions.

Iron is said to have been first discovered on Mount Ida owing to the forest having been burned by lightning, 1432 B. C., thus the metal and the means by which it was reduced from its ore were made known, and it remained then only to work it into shape by crude tools that were already invented and at hand.

The most important ores from which iron is produced are magnetite, Fe_3O_4 (magnetic iron ore), hematite, Fe_2O_3 (specular iron) and siderite, FeCO_3 (spathic iron). Iron pyrites, FeS_2 , and other sulphur combinations of iron are extensively used but must be first roasted to free them from sulphur, which is utilized as a by-product in the manufacture of sulphuric acid.

Forms of Iron.

Pig Iron is the crude form of commercial iron as it is cast when coming from the furnace.

Wrought Iron is produced from cast iron by "puddling," a process which eliminates the impurities and makes the iron malleable and ductile.

Steel is a compound of varying proportions of carbon with iron and is made differently for different purposes. The Bessemer process produces steel directly from cast iron, but first burning out the impurities and afterward adding spiegeliron, (a form of iron carrying a large percentage of carbon) until the required amount of carbon has been introduced. Other forms of steel are variously made for various uses. Crucible steel is made from purest wrought iron by melting in crucibles and adding sufficient charcoal and manganese dioxide to produce carbonation and oxidation. This form of steel is suitable for making the best grade of tools and appliances.

This steel when heated and properly tempered is the highest grade that can be produced.

Iron forms two sets of salts, the *ferrous* and the *ferric*, and, in these two conditions comprises a great number of compounds used industrially and in medicine.

Salts of Iron.

The following embrace the more important salts of iron, but many others are made and sometimes used in medicine or the arts. See Part II.

Ferrous Oxide. FeO . The rapidity with which ferrous oxide absorbs oxygen, changing it to the ferric state, makes it almost unknown except in combination. It may be prepared, however, by reducing ferric oxide with carbon monoxide. The product is a black powder which rapidly oxidizes upon exposure to air or heat.

Ferrous Hydroxide, $\text{Fe}(\text{OH})_2$, may be precipitated from solutions of ferrous salts by adding an alkali; it rapidly oxidizes in the air to ferric hydroxide.

Ferrous Chloride. FeCl_2 . This is prepared by the action of hydrochloric acid upon iron. It crystallizes from solution in green, monoclinic prisms.

Ferrous Sulphate. $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$. (Copperas or green vitriol). This is the most commonly known ferrous salt. It is prepared by the action of sulphuric acid on iron or steel. Commercially the waste of wire factories or scrap iron of any kind is treated with diluted sulphuric acid and the crystalline product—large, bright-green, monoclinic prisms—collected and drained.

Ferrous Carbonate. This may be prepared by adding sodium carbonate to a solution of ferrous sulphate, but when the precipitate is removed from the solution it very rapidly changes to ferric carbonate. Ferrous carbonate occurs in solution in mineral waters that contain an excess of carbon dioxide, but precipitates as ferric carbonate when this is no longer present.

Ferric Oxide. Fe_2O_3 . This salt which is commonly called "colcothar" is iron sesqui-oxide, and may be prepared by burning copperas in the air until it has lost its water of crystallization and become converted into a dark-red powder. The common article is known as iron paint, and is also used for polishing glass and metal. A finer powder is known as jeweler's rouge, used for polishing jewelry and silverware.

Ferric Hydroxide. This is produced when a solution of ferric salt is precipitated by an alkali.

Ferric Chloride. This may be prepared by passing chlorine into a solution of ferrous chloride.

Ferric Sulphate. This may be prepared by dissolving ferric oxide in sulphuric acid. It forms iron alum by the addition of potassium hydroxide.

Iron Acetate. $\text{Fe}_2(\text{C}_2\text{H}_3\text{O}_2)_6$. Made by dissolving freshly precipitated ferric hydrate to saturation in acetic acid, evaporating the solution and crystallizing.

Iron Arsenic. FeAs_2 . This occurs native in the mineral Leucopyrite.

Iron Arsenide. Fe_2As_2 . This also occurs native in the mineral Lölligite. Arsenical Iron Pyrites, FeAsS , is another combination of iron with arsenic called Mispickel. Iron Arsenate and Iron Arsenite are also prepared in the laboratory and furnished by manufacturing chemists.

Iron Benzoate. $\text{Fe}_2(\text{C}_7\text{H}_5\text{O}_2)_6 \cdot 6\text{H}_2\text{O}$. By adding a solution of ferrous sulphate to a concentrated solution of sodium benzoate, collecting the precipitate, washing and drying.

Iron Bromide. (Ferrous Bromide). FeBr_2 . By adding 2 parts of bromine diluted with 10 parts of water to 1 part iron wire, and digesting with gentle heat until the liquid assumes a greenish color and the reaction is completed, then filtering and evaporating to dryness.

Iron Cacodylate. This is an arsenic salt of iron prepared by the action of cacodylic acid upon ferrous carbonate. It is employed as a tonic in certain conditions where iron and arsenic are indicated.

Iron Carbonate. (Ferrous Subcarbonate). By dissolving 4 ounces of ferrous sulphate and $4\frac{1}{2}$ ounces of sodium carbonate separately, each in 2 quarts of warm water, mixing the solutions and washing the precipitate with sweet-

ened water, and drying without heat. By exposure this is converted into ferric oxide.

Iron Ferrocyanide. $\text{Fe}_4(\text{FeCN}_6)_3$. By dissolving potassium ferrocyanide and adding to it a solution of iron sulphate as long as the blue precipitate is formed, then washing the precipitate and drying. This is known as Prussian Blue. It is made soluble by the addition of 20 percent, or more of oxalic acid, and is then known as Soluble Blue, an article much sold for laundry bluing.

Iron Glycerinophosphate. This is prepared in the same manner as other glycerinophosphate salts. See Glycerinophosphates, Part II.

Iron Iodide. FeI_2 . Ferrous Iodide. Prepared by the direct union of iron and iodine. The syrup of Ferrous iodide which is official is generally used in medicine.

Iron Nitrate. $\text{Fe}_2(\text{NO}_3)_6$. By concentrating a solution of iron nitrate by evaporation and crystallizing.

Iron Oxides. With oxygen iron combines in several proportions, Ferrous oxide, FeO , being unknown except in combination, as it rapidly absorbs oxygen and passes into a higher oxide. Ferric oxide, Fe_2O_3 , is made by burning ferrous sulphate in a crucible until fumes cease to be evolved. This is known commercially as Crocus Martis, Colcothar, Rouge, Red Oxide of Iron, Venetian Red etc., as made for various uses. Magnetic Iron Oxide—Ferroso-Ferric Oxide— Fe_3O_4 —is a black magnetic iron oxide obtained in various ways and also occurring native; and some other forms not sufficiently important to notice. The German pharmacopoeia directs a soluble saccharated iron oxide to be prepared by precipitating 30 parts of a solution of iron chloride with a solution of sodium carbonate, adding solution of soda and sodium bicarbonate, washing the precipitate under water, collecting, draining and mixing it with 50 parts of sugar and drying.

Iron Persulphate. Monsell's Salt. By evaporating a solution of persulphate or tersulphate of iron to dryness. Used as a styptic.

Iron Phosphate, White. $\text{Fe}_2\text{PO}_4 \cdot 4\text{H}_2\text{O}$. Besides the official scale salt, soluble iron phosphate (a compound salt) and the former official gray powder, iron phosphate, (Ferri Phosphas, Br.), a white phosphate of iron, (ferrous phosphate), is made by mixing 4 ounces of solution of normal ferric sulphate with 1 ounce of sodium acetate in solution, and then adding a solution of sodium phosphate, and washing and drying the precipitate.

Iron Salicylate. This may be prepared by adding ferrous carbonate to a hot concentrated solution of salicylic acid until effervescence no longer occurs, then concentrating and crystallizing.

Iron Scale Salts. A considerable number of iron compounds are made in the form of scale salts. These combinations are not included in this list but will be found under the heading Ferrum in Part II.

Iron Succinate. By adding ferrous carbonate to liquid succinic acid as long as it effervesces, then concentrating and crystallizing.

Iron Sulphide. FeS . Made by heating a mixture of 3 parts iron filings with 2 parts of sublimed sulphur in a red-hot crucible, into which it is introduced in small portions at a time. This is used for making sulphuretted hydrogen.

Iron Pyrites, FeS_2 , is another combination of iron with sulphur, found abundantly in nature and much used in the production of sulphuric acid.

Some other salts of iron are used occasionally, but are seldom prepared by pharmacists and are of but little interest. Of the unofficial salts of iron not previously mentioned the more important are the Lacto-Phosphate, Salicylate, Sulpho-Carbolate, Malate and Tannate. Dialysed iron in scales is mentioned under Dialysed Iron, and the various solutions of iron among the solutions.

For other salts and chemical combinations of iron, see "Ferrum," Part II.

KRYPTON.

Sym. Kr; at. wt. ($\text{O}=16$) 82.9; density ($\text{O}=16$) 40.88; nullivalent—does not enter into combination with any known element. In the zero group of the periodic arrangement, series 6.

This is one of the rare gases discovered in the atmosphere by Ramsay and Traverse in 1897. In a more recent investigation Ramsey found but one part of krypton in seven million parts of air. It was found in the least volatile portion, when a large quantity of liquid air had been allowed to evaporate slowly.

LANTHANUM.

Sym. La; at. wt. (O=16) 139.0; sp. gr. 6.16; trivalent. It belongs in the same group with cerium, but is harder and less ductile than that metal. It is one of the rare earths, belonging to Group IV, Series 8.

Lanthanum was discovered by Mosander, a Swedish chemist, while investigating the chemistry of the rare earths in 1841. Its oxide, La_2O_3 , and its salts are colorless. This element or its salts have no medicinal or industrial use at the present time.

LEAD. (Plumbum).

Sym. Pb; at. wt. (O=16) 207.10; sp. gr. 11.25; bivalent or quadrivalent; melts at 327°C . and distils at white heat; bluish-gray color and metallic luster; malleable; crystallizes in octahedra. It oxidizes slowly on its exterior surface, in the air, forming a layer which protects it from further oxidation, in water it forms a layer of hydroxide which protects it. It is slightly affected when in masses, by sulphuric or hydrochloric acids, but is acted upon by nitric acid, when diluted, and by acetic acid and other organic acids. Lead belongs in Group IV, Series 11, in periodic arrangement.

Lead as a metal has been known from the most ancient historic times, it was known to the Israelites and was used by the Romans in much the same manner as it is used at the present time. It is seldom found native, but is chiefly obtained from "galena," lead sulphite, PbS , of which large deposits are found in various countries, particularly in the United States, in the Mississippi Valley, and the Sierra Nevada Mountains, combined with other minerals. Metallic lead is readily obtained from its compounds by smelting in furnaces and reducing its ores by such methods as experience has shown to be most effective.

Industrially, lead is second only to iron in importance; it enters into all manner of building operations; its alloys furnish type and Babbitt metals and solders, it is basis of a large portion of the paint used. It is extensively employed in making shot, and its oxide in making glass, and lead acetate is of the greatest importance in dying fabrics; besides several of its salts and compounds are considerably used in medicine.

Salts of Lead

The following are the salts of lead generally used in the arts and in pharmacy:

Lead Acetate. Sugar of Lead. This is official in all pharmacopœias and will be further considered under the title *Plumbi Acetas* in Part II. It is extensively used in the arts, especially as a mordant for dyeing.

Lead Arsenate. $\text{Pb}_3(\text{AsO}_4)_2$. Made by gradually adding a solution of lead acetate to a solution of sodium arsenate, collecting, washing and drying the precipitate. Used as an application to cancers, malignant ulcers etc.

Lead Benzoate. By adding to a hot solution of benzoic acid, a solution of lead acetate, as long as a precipitate forms, collecting and drying the precipitate.

Lead Bichromate, which is known as chrome orange or chrome red, is made by adding potassa to the solution of potassium bichromate before adding the solution of lead acetate.

Lead Bromide. PbBr_2 . By adding a solution of lead acetate to a solution of potassium bromide, collecting and washing the precipitate. Uses similar to lead iodide.

Lead Carbonate. White Lead. This was formerly official in the U. S. P., and now is in the Br. P. The method of preparing it and its uses in pharmacy will be found under the title *Plumbi Carbonas* in Part II. It is extensively used as a pigment for painting white, and as the basis of colored paints.

Lead Chloride. $PbCl_2$. By adding gradually to a solution of lead acetate in water, hydrochloric acid so long as a precipitate is formed, then collecting and drying, or by adding a solution of common salt to the solution of lead acetate.

Lead Chromate. $PbCrO_4$. By adding a solution of lead acetate gradually to a solution of potassium bicarbonate and collecting the precipitate. This is a pigment known as chrome yellow, lemon yellow, Leipsic or Paris yellow.

Lead Cyanide. $PbCy_2$. By adding hydrocyanic acid to a solution of lead acetate as long as a precipitate is formed, and collecting it.

Lead Hydroxide. $Pb(OH)_2$. This may be produced by precipitating a lead solution with an alkali. It is insoluble in ammonia, but soluble in caustic alkalies.

Lead Iodide. PbI_2 . This is official in the U. S., Br. and many of the European pharmacopœias. In pharmacy it is chiefly used in ointment and plaster preparations. It is further described under the title *Plumbi Iodidum* in Part II.

Lead Nitrate. $Pb(NO_3)_2$. This is official in the U. S. and a few European pharmacopœias. It is chiefly used in solution, externally, and for making hair restoratives. It is more fully described under the Latin title *Plumbi Nitras* in Part II.

Lead Oxalate. By adding to a concentrated solution of oxalic acid, solution of lead acetate, and collecting and drying the precipitate.

Lead Oxides. Besides the official oxide of lead (litharge), lead binoxide, PbO_2 , is made by treating red lead with nitric acid and collecting the undissolved powder, and red oxide of lead, or red lead, Pb_2O_3 , is made by heating massicot, or unfused oxide of lead, to a dull red heat in contact with air until it is converted into a bright red powder. This is also called *Minium*.

Lead Oxide. PbO . *Litharge*. This is official under the title *Plumbi Oxidum* in the U. S. and Br. pharmacopœias and under similar titles in many others; but in the Ger. and Belg. the title is *Lithargyrum*. It is the basis of most of the lead salts and is employed in pharmacy in making solutions and plasters. It is more fully considered under the title *Plumbi Oxidum* in Part II.

Lead Saccharate. By adding a solution of saccharic acid to a solution of lead acetate as long as a precipitate is formed, and collecting the same.

Lead Suboxide. Pb_2O . This is a black powder, which when heated in the air changes to a lead oxide.

Lead Sulphate. $PbSO_4$. By dissolving lead nitrate in water, adding sulphuric acid as long as a precipitate is formed, then collecting the precipitate. This is official in the Sp. Ph.

Lead Sulphocarbolate. By mixing 1 part of sulphuric acid, diluted with 4 parts of water, with 4 parts of carbolic acid, liquified by heat, and adding the mixture to a solution of lead acetate as long as a precipitate forms, then collecting and drying the precipitate.

Lead Tannate. By precipitating a solution of lead acetate with a solution of tannin, and collecting the precipitate. This is official in several European pharmacopœias.

Lead Tetrachloride. $PbCl_4$. This is formed when lead chloride in strong solution with hydrochloric acid is saturated with chlorine gas.

Minium or Red Lead, Pb_2O_3 . This may be prepared by heating lead oxide or white lead, to from 300° to $400^\circ C.$ for a considerable time in the air, until it acquires a bright red color; two other oxides of lead are known.

Some other unimportant salts of lead are known but they are made in the same general manner as the foregoing.

LITHIUM.

Sym. Li; at. wt. ($O=16$) 6.94; sp. gr. 0.58; univalent; melts at $180^\circ C.$ A silvery-white soft metal, tarnishing in moist air and burning when heated with a strong white light, to an oxide. It does not decompose at ordinary temperatures so readily as sodium or potassium but decomposes water with evolution of hydrogen. It is the lightest metal known and in periodic arrangement is the first member, after hydrogen of Group 1, being of the same family as potassium and sodium, and classed with the alkali metals.

Lithium was discovered by Arfvedson, a Swedish chemist, in 1817. It does not occur free in nature, but in various combinations it is found widely distributed, but in limited quantities. It occurs in soils and mineral waters in some localities and in the minerals lepidolite, triphylite and amblygonite, also it is found in the ashes of some plants which have, naturally, absorbed it from the soil in which they grow, tobacco and the grape vine may be mentioned.

Sir H. Davy obtained the metal from its hydrate by exposing it in contact with mercury to galvanic action, then decomposing the amalgam formed by distilling off the mercury leaving the metallic lithium. It forms a considerable number of salts with the acids and unites with the halogen elements; with oxygen it forms lithium oxide, LiO , and the hydroxide, LiOH . Lithium carbonate, Li_2CO_3 , and lithium phosphate, Li_3PO_4 , are very sparingly soluble, in which they differ from similar combinations with the other alkali metals. As many of the lithium salts are used medicinally they will be noted under "Lithium" Part II.

Lithium Salts.

A number of the lithium salts are official and will be further described under their titles in Part II; also a number of the unofficial lithium salts are used and are known in pharmacy by trade names, under which they have been brought to the notice of physicians. They are further described under their trade names in Part II.

Lithium Acetate. Dissolve lithium carbonate to saturation in acetic acid, concentrate the solution and crystallize. This must be well dried and preserved in tight bottles, as it deliquesces when exposed to air.

Lithium Benzoate. $\text{LiC}_6\text{H}_5\text{O}_2$. This is official in the U. S. and a few European pharmacopœias. Its formula and further description will be found in Part II.

Lithium Benzo-Salicylate. Dissolve equal parts of benzoic and salicylic acid in ten parts of boiling water and add lithium carbonate in small portions until effervescence no longer occurs, then set aside to crystallize.

Lithium Bitartrate. Neutralize a hot concentrated solution of potassium bitartrate with lithium carbonate, and allow to crystallize.

Lithium Borocitrate. Citric acid 10 parts, lithium carbonate 2 parts, boric acid 3 parts, dissolved together in boiling water, and carefully evaporated to dryness and crystallized.

Lithium Bromide. LiBr . This is official in the U. S. and a few European pharmacopœias. The method for preparing it and further description will be found in Part II.

Lithium Carbonate. Li_2CO_3 . This is official in the U. S., Br. and most of the European pharmacopœias. The method of preparing it and its uses will be found in Part II.

Lithium Chloride. LiCl . Dissolve lithium carbonate to saturation in hydrochloric acid, concentrate the solution by evaporation and crystallize. This is official in the Ger. S. and Greek.

Lithium Citrate. This is official in the U. S., Br. and Fr. pharmacopœias. Its formula and description will be found in Part II.

Lithium Diborocitrate. Citric acid 20 parts, lithium carbonate 7 parts, boric acid 12 parts. Dissolve in boiling water, and evaporate carefully to a dry powder.

Lithium Dithiosalicylate, Diuretin. This is prepared by dissolving lithium carbonate to saturation in a mixture of sulphuric and salicylic acids. It is used for rheumatism etc. Dose, 15 to 20 grains.

Lithium Glycerinophosphate. This may be prepared in the same manner as calcium glycerinophosphates. See Glycerinophosphates, Part II.

Lithium Iodide. LiI . Add lithium carbonate to a solution of calcium iodide until no more will dissolve when heated, then filter, concentrate and crystallize. This is official in the Ger. S.

Lithium Lactate. This may be prepared by dissolving lithium carbonate to saturation in lactic acid, evaporating by gentle heat and crystallizing. Its uses are similar to other lithium salts.

Lithium Nitrate. LiNO_3 . Dissolve lithium carbonate to saturation in nitric acid, concentrate the solution and crystallize.

Lithium Oxide is an alkaline earth, found in petalite, and in solution in many mineral waters.

Lithium Phosphate. Li_3PO_4 . This may be made by dissolving lithium carbonate to excess in phosphoric acid, concentrating the solution and crystallizing.

Lithium Salicylate. $\text{LiC}_7\text{H}_5\text{O}_3$. This is official in the U. S. and a few European pharmacopœias. It is considerably used as a remedy for gout and rheumatism. The formula for its preparation will be found in Part II.

Lithium Salicylate, Uropherin. This is prepared by neutralizing a hot concentrated solution of salicylic acid with lithium carbonate, reducing by evaporation and powdering. It is used as an antirheumatic. Dose, 15 to 20 grains.

Lithium Sulphate. $\text{Li}_2\text{SO}_4 \cdot \text{H}_2\text{O}$. Dissolve lithium carbonate to saturation in sulphuric acid, concentrate and crystallize.

Lithium Symphorol. This has been introduced as a lithium substitute for sodium symphorol. Dose, 15 to 20 grains.

Lithium Tartrate. Dissolve lithium carbonate to saturation in a strong solution of tartaric acid, concentrate and crystallize.

Many other salts of lithium may be made with other acids in the same manner as the foregoing.

LUTECIUM.

Sym. Lu; at. wt. (O=16) 174. This is the name of an element found in ores associated with cobalt, that has recently been included in the International list. But little is yet known about it and it has not been assigned a place in the periodic arrangement of elements.

MAGNESIUM.

Sym. Mg; at. wt. (O=16) 24.32; sp. gr. 1.75; bivalent, melts at 800°C . and distils at red heat. This metal is silvery-white, having a high luster; it is malleable and ductile and is most generally prepared for the market in the form of powder, wire or ribbon. In the air it soon becomes coated with oxide and thus protected from further action. At a high temperature it burns to its oxide magnesia, MgO , and in boiling water it is slowly decomposed with evolution of hydrogen. It dissolves readily in acids or salts of ammonia and is the best known test for hydrogen in any compound. In the periodic arrangement it belongs in Group II, Series 3, associated with beryllium, zinc and cadmium.

Magnesium was first discovered (impure) by Sir H. Davy, in 1808, and afterwards the pure metal was isolated by Liebig and Bussy. The metal does not occur free in nature, but is found in considerable quantities in various combinations, as magnesite, MgCO_3 , dolomite, $\text{MgCa}(\text{CO}_3)_2$, and in several of the silicates and soils with which it has been mingled by disintegration of minerals with which it has been combined.

It is now prepared chiefly by electrolysis, on a large scale, as it is much used as a reducing agent, for *flash-light* in photography and in electrical work. It may also be prepared by heating double magnesium chloride $\text{MgCl}_2 \cdot \text{NaCl}$, with sodium. The ribbon is very convenient for use as it may be lighted by a match and when once ignited will burn in most any compound or in water vapor until consumed. The powder when added to any solution containing hydrogen causes decomposition with escape of bubbles of hydrogen gas, the powder may also be mixed with oxides of iron and aluminum in fine powder in a preparation called thermit and when ignited with a magnesium ribbon will burn with intense heat, melting the most refractory substances.

Magnesium Salts.

The following salts of magnesium are all that are usually used in pharmacy or medicine but, as it combines with most of the acids and non-metals, a number of other preparations are known. The official salts are more fully considered under Magnesium in Part II.

Magnesium Acetate. $\text{Mg}(\text{C}_2\text{H}_3\text{O}_2)_2$. Made by adding magnesium carbonate to saturation in acetic acid, filtering the solution, concentrating and crystallizing.

Magnesium Benzoate. To a hot solution of benzoic acid add magnesium carbonate until effervescence no longer occurs, then filter the hot solution and allow to crystallize. Official in Nedl. S.

Magnesium Biphosphate. When magnesia is dissolved in an excess of phosphoric acid the biphosphate is formed and may be obtained by evaporating the solution and crystallizing. Its properties are similar to magnesium phosphate but it is an acid salt.

Magnesium Borocitrate. Citric acid 20 parts, boric acid 12 parts, magnesium carbonate, sufficient. Dissolve the acids in as little boiling water as is sufficient and add magnesium carbonate until effervescence no longer occurs, then continue the heat on a sand-bath until a dry powder results. Official in Ger. S. and Nedl. S.

Magnesium Bromide. This is most conveniently made by adding magnesium carbonate in excess to a solution of iron bromide, then filtering, concentrating and crystallizing.

Magnesium Carbonate. (Light). The U. S. P. recognizes only the light form, *Magnesium Carbonas*, which in the Br. P. is called *Magnesium Carbonas Levis*, Light Magnesium Carbonate. This is more fully described in Part II.

Magnesium Carbonate. (Heavy). The Br. P. recognizes the heavy form, *Magnesium Carbonas Ponderosus*, Heavy Magnesium Carbonate. This is fully described in Part II.

Magnesium Chloride. MgCl . This is a very deliquescent salt, made by neutralizing hydrochloric acid with magnesia, evaporating to dryness, adding an equal weight of calcium chloride, heating in a red-hot platinum crucible, and fusing. Official in a few European pharmacopœias.

Magnesium Citrate. $\text{Mg}_3(\text{C}_6\text{H}_5\text{O}_7)_2$. This salt is but little used, the effervescing citrate being generally employed. It may be made by dissolving citric acid 3 parts, in water $\frac{1}{2}$ part, by the aid of heat, and adding to the solution 1 part of magnesia and stirring them together until a dry mass results.

Magnesium Effervescent Salts. In the U. S. and Br. P. effervescent magnesium sulphate is official. The formula for its preparation will be found in Part II.

Effervescent Magnesium Citrate was formerly official in the U. S. but has been dismissed. Formulas for these will be found in Part II.

Magnesium Glycerinophosphate. This is prepared in the same manner as the other glycerinophosphates, which see.

Magnesium Hydroxide. $\text{Mg}(\text{OH})_2$. This may be precipitated by alkalies from solutions of magnesium salts.

Magnesium Hypophosphite. By adding magnesia to saturation in hypophosphorous acid, filtering, concentrating and crystallizing.

Magnesium Iodide. MgI_2 . This salt may be made by dissolving magnesia to saturation in hydriodic acid, concentrating and crystallizing.

Magnesium Lactate. $\text{Mg}_2\text{C}_3\text{H}_5\text{O}_3 \cdot 3\text{H}_2\text{O}$. This may be made by dissolving separately, in hot water, 6 parts of calcium lactate and 5 parts magnesium sulphate, mixing the solutions, filtering, evaporating the filtrate and crystallizing. Official in a few European pharmacopœias.

Magnesium Lactophosphate. To a mixture of equal parts of lactic and phosphoric acids, add magnesium carbonate until effervescence no longer occurs, then concentrate and crystallize or dry to a powder.

Magnesium Nitrate. $\text{Mg}_2\text{NO}_3 \cdot 6\text{H}_2\text{O}$. By adding magnesia to dilute nitric acid until neutral, filtering, evaporating and crystallizing.

Magnesium Oxide. MgO . Magnesia. With oxygen magnesium forms only one oxide. This is known as *magnesium usta* or calcined magnesia. It is a very light white powder and may be prepared by heating magnesium carbonate in a crucible to a low red heat, until it loses its carbon dioxide and water or until a small portion taken from the center of the crucible and moistened with water shows no effervescence when dropped into warm, di-

luted sulphuric acid. This is employed for some purposes in pharmacy and medicine. See Part II.

Magnesium Oxide. Magnesia. In the U. S. this is the light calcined magnesia. It will be fully described in Part II.

Magnesium Oxide, Heavy. Heavy Magnesia. In the U. S. this bears the Latin title *Magnesii Oxidum Ponderosum*, in the Br., *Magnesia Ponderosa*. This preparation will be more fully described under the U. S. title in Part II.

Magnesium Peroxide. This combination of magnesium with oxygen in a higher proportion than has been formerly introduced, has recently come into use. Two combinations, one with 15 percent., and one with 25 percent. of perhydrol may now be had in the market.

Magnesium Phosphate. $\text{MgHPO}_4 \cdot 6\text{H}_2\text{O}$. This salt may be made by mixing concentrated solutions of magnesium sulphate and sodium phosphate, allowing to stand some time, and collecting the crystals which form.

Magnesium Salicylate. To hot solution of salicylic acid, add magnesium carbonate until effervescence no longer occurs, then concentrate and crystallize to a dry powder. Official in the Roman pharmacopœia.

Magnesium Sulphate. Epsom Salts. This is official in all countries. It is more fully described under the title *Magnesii Suphas* in Part II.

Magnesium Sulphate, Dried. MgSO_4 . This is prepared by heating magnesium sulphate until it has lost one-third of its weight, then sifting it.

Magnesium Sulphite. This was formerly official in the U. S. but has been dismissed. It may be readily prepared by passing a current of purified sulphurous acid gas into a rather thick milk of magnesia until the acid is in slight excess. It is employed for the same purposes as sodium sulphite, but is less soluble, and, therefore, less disagreeable to the taste. Dose, 15 to 30 grains.

Magnesium Tartrate. This may be prepared by saturating a solution of tartaric acid with magnesium carbonate, and evaporating by gentle heat to dryness.

MANGANESE.

Sym. Mn; at. wt. (O=16) 54.93; sp. gr. 7.2 to 8.0; trivalent or quadrivalent; A grayish-white metal somewhat resembling iron, melts at about 1900°C ., rapidly oxidizes when exposed to air and is energetically attacked by acids; when impure it decomposes water. It does not occur native and is reduced from its ores with great difficulty; it can, however, be isolated by heating manganous chloride with sodium or by electrolysis of the fused chloride or chlorine. The metal itself is of no importance industrially, but its compounds are very extensively used, especially its alloys with iron, ferro manganese, *spiegeleisen*, which is of great importance in the manufacture of Bessemer steel.

In periodic arrangement it is classed in Group VII, with the halogens, although it is entirely dissimilar to them in most characteristics. It occupies an isolated position in the periodic system and only displays its family relation in its highest form of oxidation, permanganic acid, which corresponds with chlorine compound, HClO_4 .

Manganese is said to have been discovered by Gahn, a Swedish chemist, in 1774, also by Scheele in the same year. It is not found native but occurs in great abundance in the minerals pyrolusite, MnO_2 , hausmannite, Mn_3O_4 , and rhodochrosite, MnCO_3 , and in lesser quantities in some other manganite ores. In a commercial sense it is chiefly important in its oxygen compounds, and the facility with which oxygen may be liberated from them. In metallurgy the oxygen compounds of manganese are extensively used, also in glass making, while in chemistry a great number of chemicals used in the arts or in medicine are produced by the aid of manganese compounds. Many of these compounds will be noted under the heading "Manganese" in Part II.

Manganese Oxides.

Manganous Oxide, MnO , is the basis of most of the more familiar salts of manganese. It may be prepared by heating the carbonate in absence of air. An amorphous green powder results, which readily oxidizes in the air

to Mn_2O_4 . Manganous hydroxide, $Mn(OH)_2$, when freshly precipitated from a solution of manganese salt by an alkali, is white, but soon changes to brown when exposed to air. Solutions of manganous salts are pink.

Manganic Oxide. Mn_2O_3 . This may be prepared from any of the other oxides by heating with oxygen.

Mangano-Manganic Oxide. Mn_3O_4 . This may be prepared by igniting any of the other oxides in air. It is a brownish-red powder.

Manganese Dioxide. MnO_2 . This is the mineral, pyrolusite, which is the commercial basis of the manganese salts and is extensively used for obtaining oxygen for chemical and industrial purposes and in the production of chlorine. As it is found in the markets it is of different grades and those who use it largely for industrial purposes buy it upon assay.

Manganese Salts.

The following are all the salts of manganese important in medicine and pharmacy. The official salts are more fully described under Manganese in Part II.

Manganese Acetate. $Mn(C_2H_3O_2)_2$. This salt may be most conveniently made by neutralizing acetic acid with manganese carbonate, concentrating the solution by evaporation and crystallizing.

Manganese Albuminate. A yellowish-white, scaly preparation, made by precipitating an acid salt of manganese with albumen and drying the precipitate on plates. It is in its action similar to iron albuminate, which see.

Manganese Arsenate. $MnHASO_4$. By neutralizing a solution of arsenous acid with freshly precipitated manganese carbonate, concentrating and crystallizing.

Manganese Benzoate. By adding to a solution of benzoic acid manganese carbonate until no more will be combined.

Manganese Borate. This may be prepared by adding manganese carbonate to a hot saturated solution of boric acid until effervescence no longer occurs, then filtering, evaporating and crystallizing.

Manganese Bromide. This may be prepared by the interaction of a solution of potassium bromide with a solution of manganese sulphate, filtering the solution, evaporating and stirring to a granular powder.

Manganese Carbonate. $MnCO_3$. This is most conveniently made by adding a solution of manganese sulphate to a solution of potassium or sodium carbonate, washing the precipitate and drying. Official in the Fr. and Port. pharmacopœias.

Manganese Chloride. $MnCl_2$. By dissolving manganese dioxide in hydrochloric acid, purifying from iron salts etc., evaporating and crystallizing. Official in Port. pharmacopœia.

Manganese Citrate. By dissolving manganese carbonate in a strong solution of citric acid, concentrating and crystallizing.

Manganese Dioxide Precipitated. This is official in the U. S. as a preparation the formula for which will be found under Manganese in Part II. In most other pharmacopœias the native dioxide, Pyrolusite is official as Manganese peroxide, bi-oxide, di-oxide or super-oxide. Its principal use in chemistry and pharmacy is for the production of oxygen gas and chlorine or the solution of hydrogen peroxide.

Manganese Glycerinophosphate. This may be prepared by dissolving freshly precipitated manganese carbonate in the same manner as is directed for making calcium salt. See Glycerinophosphates, Part II.

Manganese Hypophosphite. Official in the U. S. P. By dissolving manganese carbonate in hypophosphoric acid, and crystallizing, or by decomposing a solution of manganese sulphate with a strong solution of calcium hypophosphite, filtering and concentrating the solution. See Part II.

Manganese Iodide. By dissolving manganese carbonate in hydriodic acid, concentrating and crystallizing in vacuo.

Manganese Lactate. By adding manganese carbonate to lactic acid until effervescence no longer occurs, then evaporating and crystallizing, or stirring to granular form.

Manganese Oxides. Besides the official Manganese Dioxide, MnO_2 , which is black, there exists the Monoxide, MnO , light green; the Sesquioxide, Mn_2O_3 , dark brown; the Magnetic Oxide, Mn_3O_4 , red; and Permanganic Oxide, Mn_2O_7 , a dark brown liquid.

Manganese Peptonate. This is made in a similar manner to manganese albuminate, using peptones in place of albumen.

Manganese Phosphate. $\text{MnHPO}_4 \cdot 6\text{H}_2\text{O}$. This is most conveniently made by precipitating a solution of manganese sulphate by adding to it a solution of sodium phosphate, washing the precipitate and drying.

Manganese Saccharate. A brown powder, made in a similar manner to saccharated iron carbonate. Contains 10 percent. of manganese carbonate.

Manganese Sulphate. $\text{MnSO}_4 \cdot 4\text{H}_2\text{O}$. This is official in the U. S. and several European pharmacopœias. Being an official salt, it is fully described in Part II.

Manganese Tartrate. $\text{MnC}_4\text{H}_4\text{O}_6$. By adding freshly precipitated manganese carbonate to a solution of tartaric acid, concentrating and crystallizing.

Manganic Acid. H_2MnO_4 , is known only by its salts, which are called manganates. Permanganic Acid, HMnO_4 , is obtained by cautiously distilling potassium permanganate with sulphuric acid. It is the acid base of the permanganate salts.

Other manganese salts and compounds will be described in Part II.

MERCURY.

Sym. Hg; at. wt. (O=16) 200.0; sp. gr. 13.595 at 0°C .; liquid metal; univalent and bivalent; solidifies at -39.4°C .; boils at 360°C .; vapor density 99.36, for H=1. Forms amalgams with many of the metals, from which it may be separated by distillation, leaving the metals. At ordinary temperatures not affected by air but at higher temperatures takes up oxygen, forming the oxide, HgO , but when higher heat is applied the oxide splits up into its elements. It distills over a little above its boiling point. It unites immediately with sulphur and the halogens, but is not acted upon by dilute hydrochloric or sulphuric acids.

In periodic arrangement it is in Group II, Series 11, classed with zinc and cadmium, because of its similar characteristics. It is the only metal liquid at ordinary temperatures and is the heaviest liquid known.

Mercury was known to the ancients and was one of the sheet-anchors of the alchemist and the early empyrical practitioners of medicine.

It occurs in nature, in very small quantities, as globules adhering to the surface of cinnabar ores or scattered in crevices or over the surface of different kinds of stones, here it has, evidently been conveyed from the reduction of its sulphides or oxides in adjacent ores. It occurs in combination with sulphur as *cinnabar*, HgS , and is obtained from mines in Spain, Mexico, Peru, California, China and Japan, by roasting the ore, eliminating the sulphur and vaporizing the mercury, which is condensed in large chambers and recovered as the mercury of commerce. The metal is named from the planet Mercury and its common name "quicksilver," from its appearance similar to melted silver. The metal was used in refining silver as early as 1540 and calomel, its chloride, was known as early as 1608.

Mercury (quicksilver) is extensively used in mining operations, to amalgamate the precious metals, and is the basis of a large line of compounds used in chemistry and medicine. Many of the compounds of mercury are official in the pharmacopœia, and many of the unofficial compounds are used in medicine. These are noted under the heading "Hydrargyrum" in Part II.

Mercury forms two classes of compounds corresponding with its oxides, mercurous oxide, Hg_2O , forming mercurous compounds, and mercuric oxide, HgO , forming mercuric compounds. Its compounds with sulphur and the halogens also furnish a considerable number of medicaments which will be duly described in Part II.

Mercury Salts.

The following are most of the salts of mercury employed in chemistry or pharmacy. Other combinations are known but they are unimportant. Mer-

cury has been so long employed in medicine that a considerable number of its salts have become official. The more important of these are more fully described under the heading Hydrargyrum, in Part II.

Ammoniated Mercury. White Precipitate. This is official under different descriptive titles in all pharmacopœias. It is prepared by precipitating a solution of corrosive sublimate with ammonia water. The formula and further description will be found under the title Hydrargyrum Ammoniatum, in Part II.

Acetate of Mercury. Made by dissolving red mercuric oxide in glacial acetic acid, concentrating and crystallizing.

Albuminate of Mercury. This is official in the Rom. Ph. It is prepared by adding white of egg to a solution of corrosive sublimate, so long as it precipitates, and washing the precipitate first with salt water, then with warm water until the washings are tasteless, they drying.

Arsenate of Mercury. By adding a solution of arsenic acid to a solution of mercurous nitrate and collecting the precipitate in the usual way.

Benzoate of Mercury. This may be prepared by adding carbonate of mercury to a hot solution of benzoic acid until it is neutral, then setting aside to crystallize. This salt, being readily decomposed, is a valuable alterative.

Bromides of Mercury. Mercuric Bromide. HgBr_2 . By dissolving red oxide of mercury in a hot solution of hydrobromic acid, filtering, concentrating and crystallizing. Mercurous Bromide. HgBr , may be made by precipitating a solution of mercurous nitrate by a solution of potassium bromide.

Carbonate of Mercury. Hg_2CO_3 . By precipitating a solution of mercurous nitrate with acid potassium carbonate, and collecting the precipitate.

Cyanide of Mercury. Mercuric Cyanide. $\text{Hg}(\text{CN})_2$. This is official in several of the European pharmacopœias under differing titles. It is employed in some chemical operations but is seldom prescribed by physicians. It was formerly official in the U. S. but has been dismissed. A formula for its preparation will be found in Part II.

Chlorides of Mercury. With chlorine mercury forms two compounds—mercurous chloride and mercuric chloride. See below.

Mercurous Chloride. Calomel. Hg_2Cl_2 , the mild chloride which is given internally, and

Mercuric Chloride. Corrosive Sublimate. HgCl_2 , which is considerably used in chemistry as a basis of mercuric compounds and, in solution, as an antiseptic and bactericide. Both of these compounds are official in all pharmacopœias and will be further noticed in Part II.

Iodides of Mercury. Two iodides of mercury are produced by different processes, both are official and their methods of preparation and medicinal uses will be best considered under their U. S. titles in Part II. See Hydrargyrum Iodidum Flavum and Rubrum.

Lactate of Mercury. This is a combination of lactic acid with mercury carbonate, the solution formed being evaporated to a powder, or granular form.

Nitrates of Mercury. **Mercurous Nitrate.** $\text{Hg}_2(\text{NO}_3)_2 \cdot 2\text{H}_2\text{O}$. By mixing 4 parts of mercury with a mixture of 3 parts of nitric acid and 1 part of water, and after 24 hours collecting the crystals. **Mercuric Nitrate.** By dissolving red mercuric oxide in an excess of nitric acid, evaporating and crystallizing.

Oleate of Mercury. A combination of mercury with oleic acid. The formula for preparing it will be found in the Oleates, Part II.

Oxides of Mercury. Two oxides of mercury are official in the U. S., Br. and all of the European pharmacopœias. See below.

Mercuric Oxide, yellow. HgO . A formula for this is official in the U. S. P. and will be found under the title Hydrargyri Oxidum Flavum, Part II. This is known in the Br. as Precipitated Mercuric Oxide.

Mercuric Oxide, red. HgO . Made by heating mercurous nitrate until all acid vapors are evolved. It has the same composition as the yellow oxide, but differs in appearance. See Part II.

Salicylate of Mercury. This salt is official in the Germ., Hung. and Russ. pharmacopœias. It is employed in medicine as an antiseptic remedy in the treatment of syphilis and other diseases which develop by absorption.

Sozoidide of Mercury. This is official in the Ger. S. and Nedl. S. It is recommended as an antiperiodic and an antisypilitic, in form of dusting powder, solution or ointment. It is a combination of sozoidol with mercury. See Sozoidol.

Succinate of Mercury. A combination of succinic acid with a mercuric base. It has been recommended highly for the form of rheumatism accompanying syphilitic affections.

Sulphate of Mercury. Mercury combines with sulphur forming a **persulphate**, Hydrargyri Persulphas, formerly official in the Br. P., and a **subsulphate**, Hydrargyri Subsulphas flavens, (yellow). Turpeth Mineral, formerly official in the U. S. These salts are still official in some of the European pharmacopœias. These salts will be further referred to in Part II.

Sulphide of Mercury (red). HgS . Cinnabar. Vermilion. Cinnabar is a native sulphide of mercury and vermilion a prepared sulphide. It is a simple combination of sulphur and mercury by the aid of heat. It was formerly official in the U. S. and is now official in several foreign pharmacopœias. It will be further mentioned in Part II.

Tannate of Mercury. This salt is official in the Aust. Ph. under the Lat. title Hydrargyrum tannicum oxydulatum. A formula for its preparation will be found in Part II.

Some other important salts of mercury are sometimes used but so seldom as to require only mention, as Chlorate of Mercury, Chromate of Mercury, Lactate of Mercury, Phosphate of Mercury etc.

MOLYBDENUM.

Sym. Mo ; at. wt. ($\text{O}=16$) 96.0; sp. gr. 8.6; sexivalent; melts at a very high temperature—less fusible than platinum. A very hard, steel-gray metal, which when heated in the air is converted into the trioxide. It is not affected by hydrochloric acid or diluted sulphuric acid, but may readily be dissolved by nitric acid and concentrated sulphuric acid. Its chloride is not known to exist, but a trichloride has been produced. In periodic arrangement it is in Group VI, Series 6, and is closely related to chromium, tungsten and uranium.

Molybdenum is not found native but chiefly in combination with sulphur in molybdenite, MoS_2 , and in a lead combination, wulfenite, PbMoO_4 . The former is used in preparing the metal and its compounds. The discovery of this element is ascribed to Hjelm, a Swedish chemist, in 1782, but was predicated by Scheele, in 1778. It has recently been found in considerable quantities in Canada and has been used as an alloy in steel manufacture with excellent results. Being a hexad it forms a great number of compounds, among which its trioxide or anhydride is the most important, being the basis of most of its salts.

Molybdenum Trioxide. MoO_3 . This is an acid anhydride like chromium anhydride and combines with alkalis forming salts known as molybdates.

Molybdic Acid. A true acid, H_2MoO_4 , may be formed by adding a strong acid to a molybdate solution, as ammonium molybdate, the precipitate first formed is redissolved in excess of the acid. This serves as a test for phosphoric acid. The molybdate salts will be noticed generally under the bases with which molybdenum is combined.

NEODYMIUM.

Sym. Nd ; at. wt. ($\text{O}=16$) 144.3; sp. gr. 6.54; trivalent; dissolves readily in acids forming rose-colored solutions. Previous to 1885 didymium was listed among the elements, but Welsbach, in his investigations succeeded in splitting it up into neodmium and praseodymium, making two elements in its place. This was accomplished by Welsbach, in 1885, and they now have their place in the International List of Elements and in periodic arrangement Neodymium being in Group VI, Series 8. It forms with potassium a double sulphate, its crystals, as well as other crystalline compounds of this element having an amethyst color and making pink solutions. Didymium from which it is separated, is associated with lanthanum, one of the rare earths.

NEON.

Sym. Ne; at. wt. (O=16) 20.2; density (O=16) 9.97; nullivalent.

When air is liquified a portion of it escapes condensation. This portion consists of nitrogen, helium and neon, the nitrogen may be removed by fixation, leaving the helium and neon. When the mixture of these gases is cooled by boiling hydrogen, neon, alone, is condensed—the temperature of boiling hydrogen is -252.8°C . Neon is in the zero group of the elements, series 3, it forms no compounds with other elements. Neon was discovered as one of the rare gases of the atmosphere, by Ramsay and Traverse, in 1898. It is found in the most volatile portion of the air together with helium. In later investigations, Ramsay obtained one pint of neon from 120 tons of air. It has no known economic value.

NICKEL.

Sym. Ni; at. wt. (O=16) 58.68; sp. gr. 8.8 to 9.1; trivalent or quadrivalent; melts at about 1600°C .; in ordinary conditions is quite brittle; but when combined with a small percentage of magnesium or phosphorus it is quite malleable.

A very hard, silver-white metal, capable of taking a high polish. It is much used as an alloy in iron metallurgy and for making German silver and alбата, used as a basis for silver plated ware. These alloys are made with varying proportions of nickel, copper and zinc. The nickel coins of the United States are made from an alloy of nickel 25% with copper 75%. Nickel alloy in various ways is also used for parts of machinery where a hard non-rusting metal is desirable.

It is unchangeable in air, but little affected by hydrochloric or sulphuric acids, but dissolves readily in nitric acid. It has magnetic qualities similar to iron, but much weaker, and is extensively used for plating iron and other metals, the process being similar to that used for silver plating, nickel ammonium solution being used as the electrolyte.

In periodic arrangement it is in Group VII, Series 4, with iron and cobalt, the three constituting the family.

Nickel was discovered by Cronstadt, a Russian chemist, in 1751. It is not found native, but occurs in niccolite and gersdorffite which are arsenic combinations from which it was formerly obtained; but it is now chiefly found in a nickel silicate called garnierite which occurs in great quantities in New Caledonia; from this ore it is separated by the blast furnace process, similar to that for iron.

Nickel forms two oxides, NiO , and Ni_2O_3 , but only nickelous oxide, NiO , forms salts. It unites with the halogens, forming nickelous bromide, chloride and iodide, with cyanogen forming nickel cyanide, with hydrogen, forming nickelous hydrate and occurs in many other combinations, but chiefly the salt of nickel employed industrially is the ammonio-sulphate, used for nickel-plating. It is not employed in medicine.

Nickel Salts.

The following are the principal salts of Nickel:

Nickel Acetate. $\text{Ni}(\text{C}_2\text{H}_3\text{O}_2)_2$. By adding nickel carbonate to acetic acid until neutralized, concentrating and crystallizing.

Nickel Bromide. NiBr_2 . By neutralizing hydrobromic acid with nickel carbonate, concentrating and crystallizing.

Nickel Carbonate. NiCO_3 . This may be made by adding sodium carbonate to a solution of nickel chloride and collecting the precipitate, or by heating nickel chloride with sodium carbonate in sealed tubes.

Nickel Chloride. NiCl_2 . By neutralizing hydrochloric acid with nickel carbonate, concentrating and crystallizing, or by heating nickel filings to low redness in a current of chlorine. Double chlorides of nickel with ammonium, potassium or sodium, may be made by combining solution of nickel chloride with solution of chlorides of the substances named.

Nickel Cyanide. NiCN_2 . By adding a solution of potassium cyanide to a solution of any nickel salt in slight excess, and collecting the precipitate.

Nickel Hydrate. $\text{Ni}(\text{HO})_2$. By precipitating a solution of any soluble salt of nickel with caustic potassa. This may be dissolved in acids for making any of the soluble nickel salts.

Nickel Iodide. NiI_2 . By neutralizing hydriodic acid with nickel carbonate, concentrating and crystallizing, or by passing vapor of iodine over nickel filings heated a low redness.

Nickel Nitrate. $\text{Ni}(\text{NO}_3)_2$. By dissolving nickel in nitric acid by the aid of heat until nitrous vapors have all passed off, then crystallizing. Green deliquescent prisms.

Nickel Nitrite. $\text{Ni}(\text{NO}_2)_2$. By dissolving nickel carbonate in nitrous acid, evaporating the solution and crystallizing. Orange-green in solutions.

Nickel Oxides. With oxygen nickel forms two compounds, the Monoxide, NiO , being of an olive-green color, and the Sesquioxide, Ni_2O_3 , a black powder.

Nickel Phosphate. $\text{Ni}_3(\text{PO}_4)_2$. By dissolving nickel carbonate to saturation in phosphoric acid and crystallizing. Green crystals.

Nickel Sulphate. NiSO_4 . By dissolving nickel carbonate or oxide in sulphuric acid diluted with water, concentrating and crystallizing. This salt is obtained in pale green crystals, and is much used for nickel-plating.

Double Sulphates of nickel with ammonium, potassium and sodium may be made by mixing a solution of nickel sulphate with a solution of the other substances. The double salts of nickel, as they are called, are much used for nickel-plating.

NITROGEN.

Sym. N; at. wt. (O=16) 14.01; sp. gr. (air =1) 0.9682; density compared with hydrogen (H=1) 13.93; bivalent. At 0°C . and 760 mm. pressure 1 liter weighs 1.2521 grams; critical temperature -146°C ; boiling point -194°C . becomes solid at -214°C . A colorless, tasteless gas comprising about four-fifths of the atmosphere. It does not unite with any of the elements at ordinary temperatures and with only a few at high temperatures, forming nitrides.

Nitrogen can readily be separated from the air by burning out the oxygen; a lighted taper floating upon water, and covered with a bell-glass will remove the oxygen, leaving only nitrogen and the product of combustion in the glass, the carbon dioxide produced by the combustion, being heavier than the nitrogen soon settles and if the bell-glass is arranged with a stop-cock at the top the nitrogen may readily be drawn off. Another simple way to obtain nitrogen is to heat ammonium nitrate and collect the gas; or to heat a mixture of sal ammoniac and potassium dichromate and collect the gas.

Although nitrogen is so inert some of its compounds are the most energetic and explosive substances known, as nitroglycerin, gun cotton (tri nitro-cellulose), gunpowder (in which potassium nitrate forms the explosive property), etc. and in thunder storms the action of the electric flash causing the explosive union of the oxygen and nitrogen in the atmosphere.

With oxygen nitrogen seems to be univalent, trivalent, quadrivalent and quinquivalent forming, with hydrogen, a most important series of nitrogen acids. With hydrogen alone five compounds are formed, the most generally known being ammonia, NH_3 , the others, hydrazine, N_2H_4 , hydrazoic acid, N_3H , and compounds of this acid with ammonia, $\text{NH}_3\cdot\text{N}_3\text{H}$, and with hydrazine, $\text{H}_2\text{H}_4\cdot\text{N}_3\text{H}$.

Nitrogen does not burn nor support combustion; in the air it serves to dilute the oxygen and, while it is essential to animal and vegetable life, animals and plants cannot exist in an atmosphere of nitrogen alone, but must have oxygen to support life.

When air is pumped through water a certain portion is absorbed. If the water is then heated to free it from the absorbed gases of the air, the gases will show only 1.87 volumes of nitrogen to 1 volume of oxygen, while in the air pumped into it there were 4 volumes of nitrogen. This shows that oxygen is much more soluble in water than nitrogen, and it further shows that the air is only a mixture of the gases and not a chemical compound.

In periodic arrangement nitrogen occurs in Group V, Series 2. It does not unite with any of the elements at ordinary temperatures and with only a few

at higher temperatures. At red heat boron, silicon, titanium, barium, strontium, calcium, magnesium, chromium, and a few of the rare elements combine directly with nitrogen forming nitrides. Magnesium nitride, Mg_3N_2 , is the only combination among them of commercial importance, as it contains a large percentage of nitrogen. With oxygen, nitrogen can be made to unite by induction sparks, reddish-brown, NO_2 , being formed. With hydrogen it is made to combine in a similar manner, their union being ammonia.

Nitrogen was discovered by Rutherford, in 1772, and was found to be a constituent of the atmosphere by Lavoisier, and by Scheele at about the same time, in 1777. It was named *azote* by Lavoisier, but afterwards was named *nitrogène* by Chaptal, from whence it has derived its English name nitrogen. In France the name *azote* is still used for nitrogen.

Nitrogen is produced commercially in the form of condensed gas, contained in steel cylinders. It is prepared by passing heated air over some substance that will absorb its oxygen, and condensing the nitrogen that is separated by pumping it into cylinders, under pressure. A process has recently been devised for fixing nitrogen obtained from air in chemical combination so that it may be utilized commercially in the production of nitrate salts.

Nitrification is a species of fermentation occurring in soils upon which sewage has been thrown, and where manure has been spread, and certain plants, as clovers, have the power to manufacture, absorb and store nitrate salts for future use.

Oxides of Nitrogen.

With oxygen, nitrogen forms five distinct compounds, which are as follows:

Nitric Oxide. Nitrogen Deutoxide or Binoxide. N_2O_2 . This is most readily obtained by pouring nitric acid on copper shavings in a retort, effervescence ensues and the arising gas—Nitric Oxide—is collected.

Nitrogen Pentoxide or Nitric Anhydride. N_2O_5 . The process for making this substance is difficult and tedious. It is obtained in colorless crystals, which melt at $86^\circ F$. and boil at $115^\circ F$.

Nitrogen Peroxide or Nitric Peroxide. N_2O_4 . This may be obtained by heating dried lead nitrate in a retort and condensing the gas which is evolved by surrounding the receiver with ice. In the absence of any moisture it crystallizes in clear transparent crystals, but if moisture be present it forms a liquid.

Nitrous Anhydride. Nitrogen Trioxide. N_2O_3 . By heating starch in powder, 1 part; with nitric acid, sp. gr. 1.25, 8 parts; in a retort and collecting the evolved gas, which must be passed through a long drying tube containing calcium chloride etc., and then condensed by cold to a blue liquid.

Nitrous Oxide or Laughing Gas. Monoxide of Nitrogen. N_2O . This is made by heating fused ammonium nitrate free from chlorine, in a glass retort, to about $200^\circ C$. ($392^\circ F$.), and gradually increasing the heat as the decomposition proceeds. The salt is decomposed into water and nitrous oxide, the gas is washed out by passing through warm water. This is the popular exhilarant known as Laughing Gas or Hyponitrous Oxide, which is inhaled before drawing teeth or other minor surgical operations.

Acids of Nitrogen.

By absorbing or uniting with the elements of water the two anhydrides of nitrogen form acids as follows:

Nitric Acid. HNO_3 . This acid is formed by the addition of the elements of water to nitric anhydride or nitric oxide, $N_2O_5 + H_2O = (HNO_3)_2$. The U. S. P. describes it as a liquid composed of 68 percent, by weight, of absolute nitric acid and 32 percent. of water. See Acidum Nitricum, Part II.

This description corresponds to the C. P., or 42° nitric acid. Commercial nitric acid is known as 38° acid, and contains more or less acids of lower oxidation. It is also known as aqua fortis, and is used to combine with bases forming nitrates, and in medicine, largely diluted, as a tonic and astringent. See Acidum Nitricum.

Nitric acid is the commercial base of the nitrates. It may be made by distilling sodium or potassium nitrate with concentrated sulphuric acid.

Nitrous Acid. HNO_2 . This is a solution of nitrous anhydride, N_2O_3 , in water. The commercial nitric acid contains nitric acid with nitrogen tetroxide, N_2O_4 . This is of a reddish color. The fumes that arise when nitric acid is boiled are principally nitrous acid. Nitrous acid combines with bases forming nitrites.

Fuming Nitric Acid or **Nitroso-Nitric Acid** is nitric acid containing a considerable amount of hyponitric acid. Commercial nitrous acid is a weak preparation of this composition.

Aqua Regia is a mixture of 3 parts of nitric acid with 4 parts of hydrochloric acid. It is a solvent for gold.

OSMIUM.

Sym. Os; at. wt. (O=16) 190.9; sp. gr. 22.4; quadrivalent; melts at 2500°C . This metal is distinguished as being the heaviest and having the highest fusion point of any substance. It was discovered by Tennant, an English chemist, in 1803, and is obtained from its iridium compound, iridosmine, by heating in a current of oxygen, when osmium is volatilized as tetroxide. It is classed with platinum metals in Group VIII, Series 10.

Osmium is used industrially in the form of fine wire in the Welsbach incandescent light.

Its principal chemical compound is the tetroxide, OsO_4 , prepared by igniting finely powdered metal in the air or by the action of chlorine on the metal in the presence of water. A solution of the tetroxide in water is improperly called osmic acid or perosmic acid. Organic substances reduce the osmium to black osmium and for this reason it is used to inject tissues for various microscopic examination, the reduced black osmium becoming plainly visible. It forms three other oxides, OsO , Os_2O_3 and OsO_2 . With chlorine it forms OsCl_2 and OsCl_4 , and upon fusion with caustic potash and saltpetre, potassium osmate, K_2OsO_4 , is formed; it crystallizes from aqueous solution in dark-violet octahedrons containing two molecules of water.

OXYGEN.

Sym. O; at. wt. (O=16) 16, (H=1) 15.88; density (air=1) 1.10535, (H=1) 15.88; a litre of oxygen, at 0°C . and 760 mm. pressure, weighs 1.4296 grams. It is bivalent, its molecule consisting of two atoms. At ordinary temperatures and pressure, it is a colorless, odorless gas, comprising about one-fifth of the atmosphere. It may be condensed to a liquid, its sp. gr. in that form being 1.124, as compared with water; its critical temperature being -118°C . and its critical pressure 50 atmospheres; its boiling point is -182.95°C . at 745 mm. pressure; its color is light blue.

Oxygen is not itself inflammable, but it supports combustion. In the process of combustion it enters into combination with various substances, either with or without the production of light, but always by the evolution of heat, either perceptible to the senses or only perceptible to very delicate instruments.

In periodic arrangement it is in Group VI, Series 1, with the elements sulphur, selenium and tellurium, which form a natural group called the "oxygen group."

Oxygen in chemical combinations forms from 44 to 48 percent of the solid crust of the earth and in the form of water, eight-ninths of all aqueous bodies, vapors and compounds; it also constitutes a considerable part of all animal and vegetable matter and, as a free gas, comprises one-fifth of the volume of the air. It may, therefore, be assumed that it constitutes about one-half of the entire substance of the earth; it also enters into most all of the many manufactured chemical products. Its chemical combination with other elements and substances is called **oxidation** and the chemicals produced may be termed **oxides**. With many of the elements it unites in more than one proportion, the combinations being known as monoxides, dioxides, trioxides, tetroxides and pentoxides, as they combine with 1, 2, 3, 4, or 5 volumes of oxygen. Oxides that are reduced from the hydrates by depriving them of the elements of water, without otherwise changing their composition are com-

monly called **anhydrides**. In combination with hydrogen, oxygen unites with many positive bases, forming hydrates or hydroxides.

Ozone is an allotropic form of oxygen produced by the union of three atoms of hydrogen in one molecule, while the oxygen molecule has but two atoms. It is a colorless gas, having a peculiar, unpleasant odor and changing rapidly to normal oxygen. It is produced by the action of electricity in the form of an electric discharge upon oxygen and was formerly called electrified air. It is a wonderful bleaching and deodorizing agent.

Oxygen was discovered by Priestley, an English chemist, in 1774, who named it dephlogisticated air, Scheele named it empyreal air, but it was given its present name by Lavoisier, from its supposed property of forming acids. He called it oxygène from Greek words signifying acid-producer. It was afterwards discovered that hydrogen was the true acid-former, but the name "oxygen" for the element remains as it was given by Lavoisier.

Oxygen may be obtained in limited quantities by heating substances containing it, in a readily separable form, and collecting the gas; such substances are potassium chlorate, potassium permanganate, potassium nitrate and other salts which part readily with oxygen when heated. In a commercial way oxygen is now obtained in several ways from the atmosphere and is furnished in steel tanks into which it is pumped and stored. It is used for making chemical compounds and, in connection with hydrogen, for welding steel for making calcium light and many other purposes, and is considerably employed in medicine, by inhalation or in other ways.

Oxygen enters into combination, either directly or indirectly, with all known substances except the zero group of elements and fluorine. As the basic name in most chemical works precedes the name of the combining ingredient the combination of oxygen with other substances will be noted in this work under the base with which it combines

PALLADIUM.

Sym. Pd; at. wt. (O=16) 106.7; sp. gr. 11.8; melts at 1500°C. (that is, melts more readily than platinum). Most of the Metals have certain peculiarities which distinguish them from other metals of the class or group with which they are associated. Palladium has the property of absorbing hydrogen in large quantities; this property is called *occlusion*, and is one of the characteristics of the platinum metals. At ordinary temperatures palladium foil absorbs, when ignited, 370 times its volume of hydrogen; by electrolysis, if palladium foil is made the cathode the metal may take up 960 times its own volume of hydrogen. The metallic appearance of the metal is not changed by this, but by heating in a vacuum the absorbed hydrogen may be recovered. When palladium is charged with hydrogen in this manner it is a vigorous reducing agent, chlorine and iodine are reduced by it to hydrogen chloride and hydrogen iodide and ferrous salts are reduced to ferric salts; in fact any combination dependent upon hydrogen for reduction is readily reduced by palladium, carrying occluded hydrogen.

Palladium is one of the platinum metals and is classed in the periodic arrangement in Group VIII, Series 6. It is a silvery-white metal occurring in combination with other metals of the platinum group and recognized by certain characteristics in common which they possess. It was discovered by Wollaston, an English chemist in 1803, in Brazilian gold ore. It forms two series of compounds, corresponding with its oxides, palladious, and palladic. It is employed chiefly for its hydrogen storage, by which it reduces chlorine, iodine and other elements and metal compounds from -ous to -ic, compounds. It is not employed in medicine.

Palladium metal may be had in form of sheets or wire. Palladium chloride, dry and in solution; palladium and sodium chloride; and palladium nitrate, dry or in solution, may be had of chemical manufacturers.

PHOSPHORUS.

Sym. P; at. wt. (O=16) 31.04; sp. gr., crystalline, 1.83 at 10°C. (its allotropic forms have different density); trivalent and quinquivalent; melts at

44°C.; boils at 290°C. Above 15°C. it becomes soft; in sunlight it becomes yellow and is coated with an opaque pink layer. It is insoluble in water and is ordinarily kept covered with water in an air-tight container. It is not affected by contact with air at low temperatures but if the temperature is higher than 0°C. it is affected.

Ordinarily phosphorus is a crystalline solid, but is furnished by manufacturers in the form of sticks; its color is very light yellow and when cold it is brittle, but upon warming to 15°C. it bends readily and becomes soft and waxy, its molecule consists of four atoms at ordinary temperatures; its vapor density between 515° and 1040°C. is 4.58 to 4.50 (air = 1) corresponding to its molecular weight, P_4 .

Allotropic Forms.

By heating ordinary phosphorus to 250°-300°C. in absence of air, it may be changed to an allotropic form known as red phosphorus. This is accomplished in a commercial way by heating ordinary phosphorus in an iron cylinder, for a few moments to the required temperature and, after cooling, treating it with carbon disulphide and with caustic soda, to remove any yellow phosphorus that may not have been transformed. "Red phosphorus" is in the form of a reddish-brown powder and is not affected by the air like ordinary phosphorus; it ignites at 260°C. Another allotropic form called "scarlet phosphorus" may be obtained by dissolving ordinary phosphorus in phosphorus tribromide and boiling the solution, when the scarlet phosphorus separates out in the form of a very fine, amorphous powder. It is not affected by air but combines with other elements much more vigorously than the red variety. This variety is particularly adapted for making parlor matches. These forms of phosphorus are not poisonous. White and black phosphorus and a liquid variety are also known, but are not used industrially nor in medicine.

In periodic arrangement phosphorus is in Group V, Series 2, having family relation with arsenic, antimony and bismuth. It does not occur uncombined in nature, but in various salts of phosphorus acids it is found in large quantities, very widely distributed. It occurs in phosphatic rocks, as phosphorite, apatite, wavellite and vivianite, and in volcanic rocks and soils. It is a constituent of bones, in which it occurs as tricalcium phosphate. This is the chief source of its supply, as a by-product of the manufacture of bone charcoal, which, after it has been used for deodorizing sugar solutions, is burned to bone-ash, and then sent to the phosphorus factory.

Phosphorus was first made known by Brandt, a German chemist, in 1733. He obtained it by evaporating urine and heating the residue with sand in an earthen retort. Scheele prepared it from bones and the process which he employed is still generally used, but has been adapted for large manufacturing purposes. The largest use for phosphorus is in the manufacture of matches, but its acids are extensively employed in making chemical products.

Combinations of Phosphorus.

Phosphorus combines with metallic bases forming phosphides, the more important ones being noticed under the metal with which it combines. It also unites with not-metals, forming compounds, the more important of which are here noticed.

Chlorides of Phosphorus. Phosphorus Pentachloride. PCl_5 . By the spontaneous combustion of phosphorus in an excess of dry chlorine, or by passing dry chlorine into liquid trichloride of phosphorus. An oxychloride phosphorus, PCl_3O , phosphorus trichloride, is made by heating chloride of phosphorus with a quantity of water insufficient to convert it into phosphoric acid.

Hydride of Phosphorus. PH_3 , or Phosphoretted Hydrogen, is an explosive gas made by boiling phosphorus with milk of lime, as in making hypophosphorous acid. It has a very disagreeable smell.

Oxides of Phosphorus. With oxygen, phosphorus forms three oxides, phosphoric oxide, P_2O_5 ; phosphorous dioxide, P_2O_3 , and hypophosphorous oxide, P_2O .

Acids of Phosphorus.

The more important of these acids are described under the heading Acids, which see.

Phosphoric Acid. U. S. **Orthophosphoric Acid.** H_3PO_4 , (tribasic), is made by dissolving phosphoric oxide in water, or by the action of nitric acid on phosphorus. The 85 percent. solution is the U. S. official phosphoric acid. The salts made by combining this acid with bases are called Phosphates.

Pyrophosphoric Acid. $\text{H}_4\text{P}_2\text{O}_7$. By heating orthophosphoric acid to 213°C . (415.4°F .).

Metaphosphoric Acid. By igniting tribasic phosphoric acid, or by dissolving P_2O_5 in cold water. These three acids correspond to the oxides above mentioned.

Phosphorous Acid. H_3PO_3 . This acid cannot be formed directly from phosphorous oxide. It is a dibasic acid, containing one hydrogen atom that cannot be replaced by a metal. The salts of this acid are called phosphites.

Hypophosphorous Acid. H_3PO_2 . This acid cannot be made directly from hypophosphorous oxide. It contains two hydrogen atoms not replaceable by a metal. It is the acid base of the hypophosphite salts.

POTASSIUM. (Kalium).

Sym. K (Kalium); at. wt. (O=16) 39.10; sp. gr. 0.875 at 13°C ; melts at 62.5°C ; boils at about 720°C . A silvery-white metal which tarnishes instantly when exposed to the air; when heated in air it burns, producing a very bright violet light; when boiled it forms a green vapor. Thrown into water it decomposes it vigorously, the heat being sufficient to ignite hydrogen liberated by the decomposition and cause the metal to spin about on the surface of the water. Potassium must be kept covered with naphtha to prevent action of the atmosphere. It is univalent, and is never found free in nature. It is soft at ordinary temperatures and may be readily cut. It unites with the halogens and non-metals and its halides and oxides and hydroxides unite with some of the metals and produce double salts, extensively used in the industries and in medicine.

In periodic arrangement it is in Group 1, Series 4, with lithium, ammonium and sodium and is familiarly known as an "alkali metal."

Potassium was discovered by Davy, the English chemist, in 1807, and was by him assigned its place as an element. In natural combination it occurs chiefly in the silicates, feldspar and mica, and in the Abraum salts, which are double salts of potassium and magnesium, known as carnallite and kainite.

Davy first obtained the metal by electrolysis of molten caustic potash, and it is now chiefly obtained commercially by heating its carbonate with charcoal in a retort, to a high degree, when the potassium distills over and is condensed in naphtha, cooled by ice.

Its hydroxide, caustic potash, is extensively used as the basis of potassium salts many of which are used in medicine and various industries. See Part II.

In most of the foreign pharmacopœias potassium is known as **Kalium**, and potassium salts as kalium salts. For example, Kalium bromatum, Kalium carbonicum etc. In some pharmacopœias the acid name precedes the basic as Carbonas Kalicus, Brometum Kalicum etc., and in countries where the native language is used as the primary title some word indicating potassium is generally used, as Bromure de potassium, Fr.; Bromuro di potassio, It. etc. In this work the English titles only will be used in this section.

Potassium Salts.

The chemical combinations of potassium with other elements and acids constitute a large class of important salts useful in the arts and industries, and in medicine. The following list includes the official salts of all nations, and the more important unofficial compounds.

Acid Potassium Antimoniate. $\text{K}_2\text{Sb}_2\text{O}_7$. This may be made by passing a current of carbonic acid gas through the normal salt. Acid potassium met-antimoniate is also prepared and used as a test for sodium.

Antimoniates of Potassium. The acids of antimony combine with potassium the same as other acids, forming normal and neutral, or acid salts.

Potassium Acetate. $\text{KC}_2\text{H}_3\text{O}_2$. This salt of potassium is official in all pharmacopœias. It is rapidly deliquescent, by absorption of moisture, when exposed to air. It may be prepared by adding potassium bicarbonate to pure acetic acid so long as effervescence continues, then evaporating the solution to dryness. See Part II.

Potassium and Sodium Tartrate. U. S. Sodium Potassium Tartrate; Br. Rochelle Salt. This salt is considerably used in medicine as a laxative. It is an ingredient of the well known seidlitz powder. The method of preparation is described in Part II.

Potassium Antimoniate. KSbO_3 . This is the normal salt produced by heating 1 part of metallic antimony with 4 parts of potassium nitrate in a crucible, washing the powdered mass with water, boiling it with water for an hour or two, which converts a portion of it into a soluble salt, obtained by filtering the solution and evaporating to dryness. This is known as "Antimony Diaphoretic."

Potassium Arsenate. KH_2AsO_4 . Official in several European pharmacopœias. Heat arsenous acid (anhydride) and potassium nitrate, each in powder 1 part, in a glass flask to dull redness until the mixture fuses and red vapors cease to be evolved. Dissolve the residue when cold in 50 parts of boiling distilled water, filter, concentrate the solution by evaporation and crystallize. Dose $\frac{1}{10}$ to $\frac{1}{8}$ grain in solution.

Potassium Arsenite is prepared in a similar manner.

Potassium Auro-Cyanide. A compound salt in white crystals, soluble in water and used by hypodermic injection against anthrax bacillus, 1 part rendering 2500 parts of blood serum unsuitable for its growth. Potassium Mercurio-cyanide is used for the same purpose, 1 part in 60000 being sufficient.

Potassium Benzoate. By neutralizing a hot solution of benzoic acid with potassium carbonate, and allowing to cool and crystallizing.

Potassium Bicarbonate. KHCO_3 . Official in all pharmacopœias. Prepared by saturating a strong aqueous solution of potassium carbonate with carbonic anhydride (gas). The solution is then filtered, concentrated and allowed to crystallize. It is used in pharmacy as the basis of other potassium salts. See Part II.

Potassium Binoxalate. *Sal Acetosella*. By fusing together potassium carbonate 1 part with oxalic acid 2 parts.

Potassium Biphosphate. By dissolving potassium carbonate in excess of phosphoric acid and allowing the salt to crystallize out.

Potassium Bisulphate. KHSO_4 . This is the residue left in the retort after preparing nitric acid from potassium nitrate and sulphuric acid. It is official in the Greek Ph.

Potassium Bisulphite. KHSO_3 . This is made by passing an excess of sulphurous acid gas into a concentrated solution of potassium carbonate.

Potassium Bitartrate. $\text{KHC}_4\text{H}_4\text{O}_6$. Cream of Tartar. Official in the U. S. P. by this name, but in the Br. P. known as Acid Potassium Tartrate. This is prepared from argols or wine-stone deposited from solution in the process of wine-making. It is further explained under the title *Potassii Bitartras* in Part II.

Potassium Borate. $\text{K}_2\text{B}_4\text{O}_7$. This is made by heating equal parts of dry potassium carbonate and boric acid in powder in a covered crucible, dissolving the sublimed mass in boiling water, filtering the solution, concentrating and crystallizing. The dose is 1 to 6 grains, for dissolving calculi etc.

Potassium Borotartrate. By heating 4 parts of cream tartar with 1 part boric acid in 10 parts, or sufficient water to dissolve them, then evaporating to dryness. This is also called Soluble Cream of Tartar. It is very soluble and deliquescent. Used for gout and lithic calculi in doses of 15 to 30 grains, and as a laxative in doses of 2 to 3 drachms.

Potassium Bromide. KBr . This is official in all pharmacopœias. It is a simple combination of bromine in slight excess with a strong solution of potassium hydroxide, which is then evaporated to dryness and the excess of bro-

mine decomposed by fusing the mixture with charcoal, then dissolving the salt and purifying by crystallization. See Part II.

Potassium Carbolate. (Phenate). By adding potassium carbonate to hot liquefied phenol, until neutralized, then crystallizing.

Potassium Carbonate. K_2CO_3 . "Salts of Tartar." This is official in all pharmacopœias and is prepared from commercial pearl ash by dissolving it in an equal weight of water, allowing it to stand a day or two, filtering the solution and evaporating it, stirring while cooling to a granular salt. It is considerably used as a basis of other potassium salts as it parts readily with its carbon dioxide. See Part II.

Potassium Chlorate. $KClO_3$. This is official in all pharmacopœias. A formula for its preparation and its medicinal uses are given in Part II. This salt is extensively used in the production of oxygen gas and in pyrotechnics. It liberates oxygen freely when heated with substances that combine with chlorine.

Potassium Chloride. KCl . This is obtained as a by-product of the manufacture of potassium chlorate and other salts, or may be made by neutralizing a solution of potassium carbonate with dilute hydrochloric acid, evaporating and crystallizing. Dose 10 to 30 grains. Official in the Fr., Ger. S. and Port. Ph.

Potassium Chloroplatinite. This is produced by the action of platinous chloride with potassium. It is employed for making test solutions.

Potassium Chromate. K_2CrO_4 . By adding potassium carbonate to a hot solution of potassium bichromate until effervescence ceases, concentrating and crystallizing. In a large way it is made direct from chrome ore, and is extensively used in dyeing. Official in the Ger. S.

Potassium Citrate. $K_3C_6H_5O_7 + H_2O$. This may readily be prepared by adding potassium bicarbonate to a strong solution of citric acid until effervescence no longer occurs, then filtering and evaporating to dryness. It is considerably used in medicine as a refrigerant. See Part II.

An effervescent Citrate of Potassium is also official in the U. S. See Part II.

Potassium Cyanate. $KCNO$. This may be made by mixing potassium ferrocyanide and litharge, and heating, then dissolving out the cyanate from the fused mass by alcohol, and crystallizing.

Potassium Cyanide. KCN . This is official in the U. S. and several of the European pharmacopœias. It is now extensively employed in the treatment of gold, silver and copper ores by the cyanide process. The formula for its preparation and its uses will be considered in Part II.

Potassium Dichromate. $K_2Cr_2O_7$. Potassium Bichromate. This is known by the former title in the U. S. and by the latter title in the Br. and several European pharmacopœias. Its method of preparation and uses will be further considered in Part II.

Potassium Ferricyanide. $K_3Fe_2Cy_{12}$. By passing chlorine gas into a cold solution of potassium ferrocyanide until it ceases to give a blue precipitate with iron chloride. It is used as a test. Official in the Ger. S. and Port. Ph.

Potassium Ferrocyanide. Prussian Blue. This is official in the U. S. and several of the European pharmacopœias. It is considerably used for dyeing and making blueing, and somewhat used in medicine. The method of preparing it is described in Part II.

Potassium Glycerinophosphate. A combination of potassium with glycerino-phosphoric acid prepared in the same manner as calcium glycerinophosphate. (See Glycerinophosphates). It is soluble in water, and is given as a nerve tonic and reconstructive. Dose 3 to 6 grains a day.

Potassium Hydroxide. KOH . Potassa. Potassa Caustica. Potassium Hydrate. This is the basis of most of the salts and preparations of potassium. The method of preparing it and its uses are described in Part II.

Potassium Hypophosphite. KPH_2O_2 . This is official only in the U. S. P. It is employed in medicine as an ingredient of solutions and syrups of hypophosphites. The formula for its preparation will be found in Part II.

Potassium Iodate. KIO_3 . This is made during the manufacture of potassium iodide, and may be obtained by dissolving out the potassium iodide

before heating the mixture in a crucible, with alcohol, and dissolving the residue which is the iodate, in hot water and crystallizing.

Potassium Iodide. KI . This is official in all pharmacopœias, and is one of the most generally used alteratives known. Its methods of preparation and uses are fully described under the title *Potassii Iodidum* in Part II.

Potassium Iodohydrargyrate. This is made by dissolving 2 parts of potassium iodide in a small quantity of hot water and adding to the solution 3 parts of mercuric iodide. Upon cooling the salt crystallizes. It is used as a test.

Potassium Nitrate. KNO_3 . Saltpetre. Nitre. It is official in all pharmacopœias. It is extensively used in the arts, especially in the manufacture of gun-powder and pyrotechnics, and in medicine in various ways. The method of producing this salt and its further uses are described in Part II.

Potassium Nitrite. KNO_2 . By heating potassium nitrate to redness, dissolving the fused mass in a little water, adding twice the volume of the solution of alcohol, and after a few hours decanting the upper stratum, separating the crystals from the lower stratum and evaporating to dryness. Official in the Ger. S.

Potassium Osmate. A combination of potassium with osmic acid. A violet-red powder, soluble in water, given in combination with potassium bromide for epilepsy; also by hypodermic injection in neuralgia. Dose $\frac{1}{60}$ to $\frac{1}{40}$ grain.

Potassium Oxalates. With oxalic acid potassium forms several salts, as follows:

Potassium Oxalate. $K_2C_2O_4$. By neutralizing a solution of oxalic acid with potassium carbonate, evaporating and crystallizing.

Potassium Binoxalate. KHC_2O_4 . Also called Salts of Sorrel, or Salts of Lemon. By saturating a solution of oxalic acid 1 part with potassium carbonate and adding to the mixture 1 part of oxalic acid, evaporating and crystallizing.

Potassium Quadroxalate. This is made by neutralizing 1 part oxalic acid in solution with potassium carbonate, then adding 3 parts of oxalic acid, concentrating and crystallizing.

The two last named are used to remove iron rust, ink stains etc., and are generally sold under the name Salts of Lemon; a simple mixture of powdered oxalic acid 4 parts and powdered potassium carbonate, 1 part being generally put up for this purpose.

Potassium Perchlorate. $KClO_4$. By heating potassium chlorate until it melts, and keeping at this temperature until gas ceases to be evolved, then dissolving in water and crystallizing.

Potassium Permanganate. $KMnO_4$. This is official in all pharmacopœias. It is used in medicine and surgery as an antiseptic, disinfectant and oxidizing agent, given in small doses internally, usually in the form of pills, and used externally in solution as a wash or application to putrescent wounds, sores etc. The method of its preparation is described in Part II.

Potassium Salicylate. $(KC_7H_5O_3)_2H_2O$. This salt may be made by dissolving 7 parts of potassium bicarbonate in water, and gradually adding 10 parts of salicylic acid and evaporating to dryness.

Potassium Silicate. K_2SiO_3 . By fusing 10 parts of potassium carbonate with 15 parts of fine sand and 1 part of charcoal a salt is obtained similar to sodium silicate, which is used for making water-glass. Official in the Port. Ph.

Potassium Sozoiodol. This is a compound prepared by neutralizing sozoiodic acid with potassium carbonate. It is a white, odorless, crystalline powder, used as dusting powder for skin diseases and eczema. For this purpose it should be mixed with from 4 to 8 times its weight of talcum powder. It is also used in the form of a 10 percent. ointment.

Potassium Sulphate. K_2SO_4 . Official in all pharmacopœias. It is obtained chiefly as a by-product of the manufacture of several other more important chemicals, or it may be prepared by decomposing potassium nitrate or chloride with sulphuric acid. In pharmacy this salt is chiefly used as a diluting ingredient in making Dover's Powder.

Potassium Sulphide. $K_2S \cdot 2H_2O$. This was formerly official in the U. S. and was made by passing a current of sulphur dioxide gas through a concen-

trated solution of potassium carbonate until the CO_2 is expelled and the liquid is strongly acid, then adding an equal weight of potassium carbonate, evaporating crystallizing, making neutral potassium sulphide. This is given as anti-ferment in bowel troubles and is sometimes used to prevent fermentation of fruit or juices of fruit and vegetables.

Potassium Sulphide. K_2S . By passing a current of sulphuretted hydrogen into a solution of potassa as long as it is absorbed, then adding an equal quantity of solution of potassa and evaporating.

Potassium Sulphocarbonate. K_2CS_3 . By mixing a solution of potassium sulphide with carbon bisulphide and evaporating without heat.

Potassium Sulphocyanate. KSCN . By melting together 17 parts of potassium carbonate, 32 parts of sulphur and 46 parts anhydrous potassium ferrocyanide and heating to redness, exhausting with water, evaporating the solution to dryness, powdering and exhausting with alcohol and crystallizing. This is chiefly used as a test for ferric oxide. Official in the Ger. S.

Potassium Tartrate. Normal Potassium Tartrate. Neutral Potassium Tartrate. This is official in the Br. and several European pharmacopœias. It may be prepared by neutralizing a hot solution of potassium bitartrate with potassium bicarbonate, filtering and evaporating to dryness. In medicine it is used as a laxative in small doses and a purgative in large doses. See Part II.

Other salts of potassium are known but the foregoing are all that are liable to be called for.

PRASEODYMIUM.

Sym. Pr; at. wt. ($\text{O}=16$) 150.6.

This element was discovered by Auer von Welsbach in 1885. He found that didymium, which was at that time classed with the elements, could be split up into two components, one of which he named praseodymium and the other neodymium. This was discovered by the difference in solubility of their double sulphates in concentrated solution of potassium sulphate. The praseodymium salts are green and when dissolved give a green solution; neodymium salts are amythest in color and, when dissolved give pink solutions. In periodic arrangement praseodymium occurs in Group V, Series 8. It is classed with the rare earths and has no present use in the arts or medicine.

RADIUM.

Sym. Ra; at. wt. ($\text{O}=16$) 226.4.

This element which has recently been brought into great prominence on account of its wonderful properties was discovered by M. and Mme. Curie of Paris in 1898. Becquerel had discovered some time previously that uraninite emitted peculiar rays of light which moved in a straight line and acted on a photographic plate but could not be reflected or refracted or polarized. These rays when they pass through gases cause them to become electrical conductors. It is chiefly due, however, to M. and Mme. Curie, that the knowledge of the emission of these peculiar rays (or radio-activity) is caused by the presence, in very minute quantities, of three elements hitherto unknown, and possessed of very unusual properties.

In separating these radio-active elements from uraninite residues after the extraction of uranium, their only guide was to measure the radio-activity of the products obtained in each operation, which was done by measuring the conductivity of a layer of air exposed to the rays. By various chemical operations they succeeded in concentrating the active substance, radium.

It is obtained chiefly from ores containing uranium, one of the rare metals which has been for a long time known to possess radio-activity in a limited degree. Pitchblende, which is a refuse remaining after extracting uranium from uranite ore, contains minute quantities of radium which is extracted from it by a complicated process, in the form of chloride or bromide salt. So minute is the quantity of radium in this refuse that it requires 8 tons to produce 15 grains of the pure chloride of radium. Pitchblende also contains polonium and actinium, which are strongly radio-active substances, showing

much analogy to radium, but their elemental nature has not yet been established because of their extremely limited occurrence.

The radium works near Ivry Cemetery, just outside Paris, were established in 1901. They imported the refuse pitchblende from Bohemia and after much labor and experiment succeeded in obtaining very small quantities of the radium salt. Since then other plants have been established, but its production is still very limited, and only sufficient to supply the demand for scientific uses.

Radium is supposed to be a metal somewhat like sodium, so readily oxidized by contact with air that it cannot be safely handled in a pure state. Its chloride or bromide combinations with barium or other inert minerals only are available, and only very dilute compounds in which radium is represented can be employed. It appears to possess the property of radiating light and heat without any appreciable diminution of its substance, but this assumption yet remains to be proven.

The radio-activity of radium is its radiant power, or property of emitting heat and light. This is based upon the concentration and purity of the metal, the same property of uranium being assumed as 1. Thus in the earliest separation from the ore radium is brought to the intensity of 2000, while by successive concentrations and crystallizations it is brought to 50,000; 200,000; 500,000; and finally to 1,500,000, which is practically pure radium chloride. The metal itself has never been isolated because its affinity for oxygen would immediately destroy or dissipate it. Sir William Crookes discovered that the spectrum of radium and helium show the same distinctive line, which indicates their similarity of composition and he presumed that radium may be transformed into helium. Ramsay and Loddy have shown that there is a connection between the emanation of radium and helium and that radium can produce helium, another evidence of this is that helium has always been found in radium-bearing minerals. The radio-emanation from radium behaves in many respects as a gas; Rutherford has called the activity which escapes from a radio-active substance, "emanation," this emanation spreads out into surrounding space like a gas and produces conductivity of radiant energy in the medium in which it is diffused. It passes from one vessel to another, is carried along by a gas current and may be condensed by cooling with liquid air. The condensation occurs very suddenly at -151°C . The effect of pressure or chemical combination produces alteration on the emanation. It is not affected by changes in temperature from -180°C . to $+500^{\circ}\text{C}$. and even when cooled by liquid hydrogen to -253°C . it still radiates heat. The heat evolved by one gram of radium is calculated at 100 gram-calories per hour, and radium salts always have a higher temperature than their surroundings. From this property of heat emanation it has been regarded possible that the energy of the sun and the fixed stars is due to radio-active substances and that the radiation of the sun and the heavenly bodies is fully explained by the presence of radium. However that may be, its energy is, at present, the scientific puzzle of the day and we must trust to the future to solve the puzzle as it has already solved many of the mysteries of the universe.

The industrial uses of radium as well as its medicinal application are yet to be determined, although there are many who have predicted most marvellous results from its use.

The discovery of radium has introduced a new problem into the atomic conception of the constitution of matter, which has caused a reconstruction of the atomic theory; and, altogether, it is the most startling discovery the world has even witnessed.

In periodic arrangement radium is assigned to Group II, Series 12.

RHODIUM.

Sym Rh; at. wt. (O=16) 102.9; sp. gr. 12.1; is not affected by acids nor aqua regia; is unaffected by air at ordinary temperatures, but when heated in air is oxidized into rhodious oxide, RhO . The rhodic oxide, Rh_2O_3 , combines with acids, forming rhodate salts. With chlorine it forms Rh_2Cl_6 , similar to aluminum combinations, and with the alkali chlorides it forms double salts,

like aluminum. The fused metal has similar characteristics as aluminum and is as malleable and ductile as silver.

In periodic arrangement it is in Group VIII, Series 6, with ruthenium and palladium in a class with the platinum metals of lighter weight. It has no industrial or medicinal uses at the present time.

RUBIDIUM.

Sym. Rb; at. wt. ($O=16$) 85.45; sp. gr. 1.52; univalent; melts at 38.5°C . A silver-white, slightly yellowish metal having properties similar to potassium. It remains soft down to -10°C . and distils below red-heat with a bluish-green vapor. Rubidium is one of the group of alkali metals, and was discovered by Bunsen and Kirchhoff in 1860, by spectrum analysis, deriving its name from the most important dark red lines (rubidus) in the spectrum.

This element occurs in very small amounts in lepidolite, or lithia mica and in some waters of mineral springs, where potassium salts are present. The metal may be obtained by heating the hydroxide with magnesium in an iron pipe. It has properties similar to potassium, its hydroxide being strongly basic and combining with the halogens and with its hydroxides forming salts with acids.

In periodic arrangement it is with the alkali metals in Group I, Series 6, having similar characteristics as potassium and caesium. It has no industrial or medicinal use at the present time.

RUTHENIUM.

Sym. Ru; at. wt. ($O=16$) 101.7; sp. gr. 12.26; quadrivalent. A steel-gray metal, very hard and brittle, and fused with great difficulty, its melting point being at least 1800°C . It is almost insoluble in any acid, but when alloyed with platinum it may be dissolved in aqua regia.

Ruthenium is one of the platinum metals, being obtained from the same sources and combined in the same mixtures as rhodium, palladium, osmium, iridium and platinum, which are always found together. It belongs to the light sub-group of these metals. In periodic arrangement it is in Group VIII, Series 6, with rhodium and palladium. It forms combinations with chlorine and burns in oxygen forming a series of oxides, which may unite with acids. In the industries and medicine it has no importance at present.

SAMARIUM.

Sym. Sa; at. wt. ($O=16$) 150.4.

This is one of the rare earths about which very little is known. They occur about the middle of the periodic arrangement and are so similar in characteristics and so rare that they command but little attention. It is chiefly through the investigations of Auer von Welsbach that they have been discovered and only a few, used for making mantles for incandescent gas lighting, have been utilized.

Samarium was discovered in 1879 by Boisbaudran, a French chemist. Its salts are yellow and have a characteristic absorption spectrum. In periodic arrangement it is in Group I, Series 9. It has not as yet any industrial or medicinal importance.

SCANDIUM.

Sym. Sc; at. wt. ($O=16$) 44.1; trivalent. This is one of the elements predicted by Mendelejeff, who named it eka-boron before its discovery. It was afterwards really discovered by Nilson, a Swedish chemist, in 1879, and assigned a place among the elements under its present name. It is another of the "rare earths" and has characteristics placing it in the aluminum group of metals. In periodic arrangement it is in Group III, Series 4, and forms similar compounds as aluminum.

SELENIUM.

Sym. Se; at. wt. ($O=16$) 79.2; sp. gr., metal, 4.28; crystallized, 4.50; bivalent and sexivalent. It is found native in pyrites and is analogous to sulphur in many respects. It is chiefly obtained from the refuse of sulphuric acid manufacture from pyrites, when certain pyrite ores are employed. The

selenium collects in the residue of the lead chambers, from which it is chiefly collected. This deposit is heated with nitric acid and the selenium is oxidized to selenic acid, this solution is then boiled with hydrochloric acid which forms selenious acid, with evolution of chlorine. This acid is then reduced by sulphurous oxide to selenium, which separates in amorphous red flakes.

It melts at 217°C .; its boiling point is 680°C . and its vapor density decreases with rising temperature to about 1400°C ., when it remains constant. These characteristics are like sulphur which it resembles in many particulars. It combines with hydrogen when heated to 400°C ., forming H_2Se , and with chlorine forms two compounds, Se_2Cl_2 and SeCl_4 , the latter being a solid which sublimes without decomposition. Selenium dioxide, SeO_2 , is the only oxygen combination known and results from burning selenium in the air. This compound forms when dissolved in water, selenious acid, H_2SeO_3 , which may be crystallized in large, colorless prisms.

This element and its salts occur in ores or compounds quite widely distributed, but in small quantities. It was first isolated by Berzelius, a Swedish chemist, in 1817.

In periodic arrangement it is in Group VI, Series 5, having properties similar to sulphur and tellurium. It is not employed industrially or medicinally, but is found as a compound in ores and compounds associated with sulphur.

The metal Selenium, when melted and quickly cooled looks like hard tar, showing like sulphur, an amorphous form, but if the heat is continued for some time it acquires the appearance of a metal, showing bright when cut, like lead.

Selenium oxide is now being used to give a beautiful ruby color to glass which is particularly desirable for railroad and signal lights. It is also used for making a fine red enamel on metal and is being employed for that purpose.

In the form of powder, when burned, it emits a most beautiful blue light.

The most singular property of Selenium, however, is that in the light it is a conductor of electricity, but in darkness it is not. This property has been utilized in connection with gas buoys that light themselves at night and put themselves out at daybreak. This element is also used in measuring the intensity of light, and experiments are now being conducted for utilizing it in sending photographs by wire.

Selenic Acid. H_2SeO_4 . This is prepared by fusing selenium with potassium or sodium nitrate, treating the fused mass with water, precipitating the solution thus made with lead nitrate, and then decomposing the precipitated lead selenate with sulphuretted hydrogen, and separating the liquid, which is the selenic acid, from the precipitate. This acid unites with bases forming selenates.

Selenous Acid. H_2SeO_3 . This may be made by heating the foregoing rapidly. Its combinations with acids are called selenites.

SILICON.

Sym. Si; at. wt. ($\text{O}=16$) 28.3; sp. gr. 2.49; quadrivalent. This element does not occur uncombined in nature, but in combination with oxygen (Silica, SiO_2) forms a large portion of the earth's crust. It is found most conspicuously as silica, SiO_2 , or in combination with other substances forming minerals known as silicates. Natural silicates are found in great abundance as sand and quartz which are silicon dioxide, and it occurs in combination with other elements in much of the vast rock formations of the earth. Scientific calculations show that silicon comprises one-fourth of the material of the entire earth.

Silicon ignites with fluorine at ordinary temperatures; with chlorine it unites upon warming slightly; with nitrogen at an elevated temperature, being chiefly combined in the electric furnace; and in the air igniting with oxygen at very high temperatures and burning to silica.

It is not affected by acids, except hydrofluoric, in which it readily dissolves. With hydrochloric acid it reacts at very high temperatures forming silicon tetrachloride and silicon-chloroform. In a hot solution of potassium

or sodium hydroxide, silica dissolves, and when silica is heated with caustic soda or potassa a syrupy compound, known as "water glass" is produced.

Silicon was isolated by Berzelius, a Swedish chemist, in 1823. In periodic arrangement it is in Group IV, Series 3. It has many peculiarities which distinguishes it, notably, from other elements. It is analagous to carbon, tin, titanium, zinc and thorium. Crystalline silicon or silica are not affected by acids (except hydrofluoric), but are dissolved by caustic alkalies. Glass is a combination (chiefly) of silica and soda. Opals are natural silicates. With the halogens it combines forming a class of simple compounds, and with hydrogen and oxygen it makes a gelatinous mass caused by the union of silicic acid with alkaline bases. Mortar, which is used for laying bricks or stone or for plastering, consists chiefly of gelatinous silica combined with calcium into a mass which cements when dry. It also forms compounds with nitrogen and with sulphur, when properly brought together.

Silica. SiO_2 . This may be obtained most conveniently by decomposing the solution of sodium silicate with hydrochloric acid, washing and drying the precipitate. It is a fine white powder, insoluble in all acids except hydrofluoric. It is an anhydride, but more frequently called silicic acid. It is soluble in strong alkali solutions by the aid of heat, forming salts called silicates, as sodium silicate, potassium silicate etc.

In the crystalline form silica is found in agate, amethyst, chalcedony, cornelian, onyx etc., colored variously by admixture with other substances. In the form of sand and quartz, silica is extensively employed in the manufacture of glass, being fused with soda ash or other alkali.

SILVER. (Argentum).

Sym. Ag (Argentum); at. wt. ($O=16$) 107.88; sp. gr. 10.5; bivalent; melts at 945°C . A white metal with a brilliant metallic luster; other metals are compared with it in color as "silver-white," or "silvery-white." It crystallizes in regular octahedrons and is very malleable and ductile; can be beaten into silver leaf or drawn into fine wire. At a very high temperature in a suitable apparatus, it volatilizes in the form of blue vapor which may be condensed as pure silver.

It is one of the noble metals; this term being applied to metals which do not combine with oxygen directly at any temperature under ordinary pressure, molten silver, however, absorbs or occludes oxygen, but upon cooling to a solid it escapes.

It is the best conductor of heat and electricity of any of the metals; is not tarnished by pure air, but in air containing sulphurous gases it becomes covered with a dark film which may be removed by rubbing with ammonia water or solution of potassium cyanide. Silver is a prehistoric metal, known in all ages and used since the earliest civilization as an article or ornament, and as money, since money coinage began. It occurs native, sometimes in nuggets of considerable weight, and in ores, associated with other metals, gold, copper and lead principally, and is separated from its combinations by various complicated processes. In mining by the amalgamation process it unites with gold in the amalgam formed and the combined metals are made into bricks which are sold upon assay and the metals separated, when desired, at the mints. Most lead ores contain some silver which in smelting all goes into the lead. This lead is then fused and slowly cooled until it begins to congeal, when the lead first crystallizes out separating in this manner from the silver, this is then separated by cupellation, the fused lead sinking into the cupel and leaving the silver on the surface. Several other methods of separating silver from its combination with other metals are in use; the electrolytic process being particularly useful in recovering it from cyanide process liquors and copper slimes.

In periodic arrangement silver is in Group I, Series 5, having characteristics similar to gold and copper. It is extensively used for silver-plating and in coinage in all countries. The U. S. silver coins contain 90 percent. of silver and 10 percent. of copper, the mixture with copper making it harder than pure

silver. Silver salts are used in great quantities in photography and considerably in making hair dyes. In medicine the silver salts are employed for various uses, silver nitrate is used as a caustic, and a variety of compounds of silver with casein, albumen and other organic substances have recently come into prominence in the treatment of certain germ and infectious diseases.

As the chemical compounds of silver are considerably used in medicine, they will be noticed under *Argentum* in Part II.

Silver Purified. Silver may be purified for chemical use by dissolving it in pure nitric acid diluted with distilled water, then adding to the solution hydrochloric acid which precipitates the silver as chloride. This precipitate is then collected, washed with distilled water and melted in a crucible; the poured off metal is pure silver.

Silver Salts.

In pharmacy silver is known in all pharmacopœias that give Latin titles, as **Argentum**, and the salts of silver are *Argentum*, either followed by, or preceded by the name of the element or acid with which it combines to form the salt, as *Argenti Nitras*, *Argentum Nitricum*, *Nitras argenti*, *Nitras argenticum* etc. In pharmacopœias which have the native names of the country the word signifying silver may precede or follow the name of the combining substance; as *Argent azotic*, Rom.; *Azotate d'argent*, Fr.

The following list comprises most of the salts of silver now in use, but many combinations with albumen, casein and like substances have recently appeared under trade names, which are referred to elsewhere. The salts included in this section are chiefly well defined chemical salts that have been known for a long time, the most important of which are official.

Argentamine. Ethylenediamine-Silver-Phosphate Solution. This is a germ-destroying agent prepared by Schering of Berlin, specially for the destruction of micrococcus gonorrhœa. It contains 8 percent. of silver phosphate, (corresponding to an aqueous solution containing 10 percent. of silver nitrate) and 15 percent. of ethylenediamine. It is used by injection.

Argonin. A compound of silver nitrate with a sodium product of casein. It is a powerful antiseptic, but does not cauterize. Under this or several similar names it is employed in injections for gonorrhœa etc.

Silver Antiseptics. A number of proprietary silver compounds similar to the two foregoing have been recently introduced. They will be referred to in Part II.

Silver Acetate. $\text{Ag}_2\text{C}_2\text{H}_3\text{O}_2$. Made by decomposing a solution of silver nitrate by adding to it a solution of sodium acetate, collecting the precipitate, washing and drying.

Silver Bromide. AgBr . By decomposing a solution of silver nitrate by adding to it a solution of potassium bromide, collecting the precipitate, washing and drying.

Silver Chloride. AgCl . By adding to a solution of silver nitrate hydrochloric acid or common salt as long as a precipitate is formed, then collecting, washing and drying the precipitate. This is freely obtained by precipitating the washings of photograph plates with common salt.

Silver Chromate. Ag_2CrO_4 . By adding a neutral solution of potassium chromate to a solution of silver nitrate, collecting, washing and drying the precipitate.

Silver Citrate. $\text{Ag}_3\text{C}_6\text{H}_5\text{O}_7$. Also known as Credé's antiseptic, and marketed in this country as **Itrol**. It is a white, odorless powder, soluble in 3800 parts of water. It is applied in the form of ointments, 1 to 2 percent.; and in solution, 1:400 to 1:800, as an injection for gonorrhœa.

Silver Cyanide. AgCN . This is official only in the U. S. The formula for its preparation and its uses are given in Part II.

Silver Iodide. AgI . This was official in the U. S. P., 7th revision, but has been dismissed. It may be prepared by precipitating a solution of silver nitrate with a solution of potassium iodide.

Silver Lactate. $\text{AgC}_2\text{H}_3\text{O}_2 + \text{H}_2\text{O}$. Also known as **Actol**. A white, odorless and nearly tasteless crystalline powder, soluble in about 15 parts of water. This was introduced by Credé as an antiseptic in certain infectious diseases and

as an application for wounds, ulcers etc. Used as a wash or by injection in solution, 1:500 to 1:100.

Silver Nitrate. AgNO_3 Lunar Caustic. This is the most important and best known salt of silver and forms the basis of most of the other silver salts. It is official in all pharmacopœias and is prepared for medicinal use in several forms which will be described together with the method of preparation in Part II.

The crystallized nitrate of silver is extensively used in photography, and for making hair dyes.

Silver Nitrite. AgNO_2 . This is formed as a yellowish precipitate, when an alkaline nitrite solution is mixed with a solution of silver nitrate. It dissolves in boiling water and, upon cooling, crystallizes in beautiful needles.

Silver Oxalate. $\text{Ag}_2\text{C}_2\text{O}_4$. By adding a solution of oxalic acid to a solution of silver nitrate, collecting, washing and drying the precipitate.

Silver Oxide. Ag_2O . This is official in the U. S. and Br. pharmacopœias. A formula for its preparation is given under the title *Argentum Oxidum* in Part II.

The photographic arts and the use of indelible ink and hair dyes depend upon the conversion of silver nitrate into silver oxide, which is insoluble.

Silver Phosphate. Ag_3PO_4 . By decomposing a solution of silver nitrate by adding to it a solution of sodium phosphate, collecting the precipitate, washing and drying.

Silver Sulphate. Ag_2SO_4 . By decomposing a solution of silver nitrate by adding to it a solution of sodium sulphate, collecting the precipitate, washing and drying.

Many other salts of silver exist in nature in the form of ores, as Silver Sulphide, Silver Carbonate etc., or may be made in the laboratory by combining it with various acids, but those already mentioned are all that are of interest in pharmacy.

SODIUM. (Natrium).

Sym. Na (Natrium); at. wt. (O=16) 23.0; sp. gr. 0.973 at 13.5°C .; univalent; melts at 95.6°C .; boils at 900°C . at which temperature it vaporizes and may be condensed in a receiver, under petroleum, cooled by ice. It may then be purified by melting it under boiling petroleum and pressing it through linen bags. The product is then cast into cakes, which are broken up, or into sticks, in which form it is generally found in the market.

Metallic sodium is silvery-white and so soft that it can readily be cut with a knife or pressed through a small hole coming out in the form of wire; in dry air it will keep for several days untarnished, but in moist air it oxidizes rapidly.

It may be heated to its melting point without taking fire, but at a much higher heat it ignites, burning with a characteristic bright-yellow light, by which its presence in compounds is readily recognized. When added to water it decomposes it, generating hydrogen and forming sodium hydroxide. By floating a piece of sodium on a piece of filter paper on water the escaping hydrogen takes fire and burns, the same occurs if sodium is placed on ice. Because of its strong basic power it is of great value in the arts and in the laboratory for reducing elements from their oxides. Before the introduction of electric decomposition sodium was extensively used in the production of aluminum, magnesium and other metals. Many of the important industries depend upon sodium and its hydroxide for the results accomplished.

In periodic arrangement sodium is in Group I, Series 3, classed with the alkali metals. It combines with all the halogens and with all non-metallic oxides forming salts of great commercial and medicinal value and with organic bases forming an extensive line of compounds, many of which are employed in medicine.

Sodium was first isolated by Sir H. Davy in 1807. It is not found uncombined in nature, but in chemical combination it forms about 2.25 percent. of the material of the entire earth. It is found by the spectroscope to be a constituent of the sun and many of the fixed stars and altogether is one of the most important of the elements.

As its compounds are important in medicine they will be more particularly noted under the heading Sodium in Part II.

Sodium Salts.

In most foreign pharmacopœias sodium is known as Natrium, and sodium salts as Natrium Salts; as, for example: Natrium Aceticum, Natrium Bromatum etc. In some of the pharmacopœias the basic name precedes the acid; as Natrium Phosphoricum; and in others the acid name precedes the basic; as, Sulfas Natricus, Carbonas Natricus etc. But in pharmacopœias where the language of the countries is used as the primary title, the word meaning soda, and the acid is generally used, as Bromure de Sodium, Fr.; Bromuro di Sodio, It.; Sodiū Azotic, Rom. In this work the word sodium, followed by the name of the salt produced, as Sodium Acetate, Sodium bromide etc., is used to designate the compound.

The following list includes all of the salts of sodium official in any pharmacopœia, and many not official, but sometimes used. The official salts, and others of considerable importance will be further explained under the title Sodium in Part II.

Sodium Acetate. $\text{NaCO}_2\text{O}_3 + 3\text{H}_2\text{O}$. Official in most all countries. It may be prepared by neutralizing acetic acid with sodium carbonate, filtering the solution, concentrating by evaporation and stirring to a granular salt. See Part II.

Sodium Agaricinate. A combination of agaric acid prepared by neutralizing it with a sodium salt. It is a white, tasteless powder, freely soluble in water, and is used for night-sweats of consumptives. Dose $1\frac{1}{2}$ to 3 grains.

Sodium Arsenate. $\text{Na}_2\text{HASO}_4 + 7\text{H}_2\text{O}$. Official in U. S., Br. and several European pharmacopœias. The method of preparation is given in the Br. P. and will be found in Part II.

Sodium Arsenite. Used for the same purposes as sodium arsenate, as an alternative. Dose $\frac{1}{40}$ to $\frac{1}{10}$ grain.

Sodium Benzoate. $\text{NaC}_7\text{H}_5\text{O}_2$. Official in the U. S., Br. and all European pharmacopœias. It may be prepared by neutralizing a hot, concentrated solution of sodium carbonate with benzoic acid, and evaporating the solution with stirring to granulation. See Part II.

Sodium Bichromate This is made by neutralizing a solution of chromic acid with sodium carbonate, concentrating and allowing to crystallize.

Sodium Bicarbonate. NaHCO_3 . Official in all pharmacopœias. This is prepared by exposing sodium carbonate to the action of carbon dioxide until it has taken up another molecule of the gas. Or may be made by the interaction of sodium chloride and ammonium bicarbonate. See Part II.

Sodium Bisulphate. By adding sulphuric acid in excess to a solution of sodium bicarbonate and allowing to crystallize.

Sodium Bisulphite. NaHSO_3 . Official only in the U. S. and Fr. pharmacopœias. It is used for treating cloth after bleaching to remove excess of chlorine compounds. In medicine it is employed as an antiseptic and antiferment. See Part II.

Sodium Bitartrate. By adding tartaric acid in excess to a solution of sodium bicarbonate, and allowing to crystallize.

Sodium Borate. U. S. $\text{Na}_2\text{B}_4\text{O}_7$. **Borax.** Br. This is official in all pharmacopœias but with different titles. It is chiefly prepared by refining native borax and is further described in Part II.

Sodium Bromide. NaBr . Official in the U. S., Br. and nearly all other pharmacopœias. This may be prepared by adding a slight excess of bromine to a strong solution of sodium hydroxide, evaporating the solution to dryness, decomposing the bromide by fusing the mixture with charcoal, dissolving with water, filtering and evaporating to crystallize the sodium bromide. See Part II.

Sodium Cacodylate. **Dimethylarsenate.** The combination of sodium with cacodylic acid is a white, amorphous powder used as an alternative in the same manner as arsenic salts, but in this compound is considered far less toxic than the alkali salts. Dose $\frac{1}{2}$ to 2 grains, or subcutaneously $\frac{3}{4}$ to $1\frac{1}{2}$ grains.

Sodium Carbolate. $\text{NaC}_6\text{H}_5\text{O}$. Made by adding metallic sodium to carbolic acid and allowing the solution to crystallize.

Sodium Carbonate. $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$. Sal Soda. This salt which is commercially known as "Sal Soda" is official in the Br. P. and in all of the European pharmacopœias. It is prepared from soda ash by lixiviation and crystallization. Soda ash contains about 50 percent. of commercial sodium carbonate. It is also prepared by the "ammonia process," the "cryolite process" and the "Solvay process." It is very extensively used in the industrial arts and is the source of most of the sodium salts. The 8th revision of the U. S. P. introduced a monohydrated sodium carbonate which is as follows:

Sodium Carbonate Monohydrated. U. S. $\text{Na}_2\text{CO}_3 + \text{H}_2\text{O}$. This differs from the above in containing only one molecule of water instead of 10. It is therefore ten times as strong as the regular sodium carbonate and is nearly the same as the Br. and former U. S. Exsiccated Sodium Carbonate, and similar preparations of the European pharmacopœias. The method of preparing this salt is explained in Part II.

Sodium Chlorate. NaClO_3 . This is official in the U. S. and the majority of the foreign pharmacopœias, but not in the Br. It may be prepared by the interaction of acid sodium tartrate in solution and potassium chlorate in solution. Acid potassium tartrate is precipitated leaving sodium chlorate in solution, which is filtered, evaporated and crystallized. Its uses are the same as potassium chlorate but it is more soluble.

Sodium Chloride. NaCl . Salt. This is the ordinary common salt of commerce, in use and official in the pharmacopœias of all countries. It is one of the most abundant and widely distributed of natural salts. It is found in beds and mines as rock salt, and in solution in sea water, and salt springs and wells obtained by drilling, from which it is separated in crystalline form by evaporation. It is extensively used for various industrial purposes and as a seasoning and preservative of food. In pharmacy it is employed as a source of chlorine, and in medicine is used as a styptic, and for intravenous injection and some other purposes.

Sodium Cinnamate. A white powder, soluble in water, prepared by adding cinnamic acid to solution of soda until neutralized, then evaporating and crystallizing. Like cinnamic acid, it is a ready remedy for tuberculosis. It is given in a 5 percent. solution by intravenous injection, twice a week.

Sodium Citrate. By saturating a solution of citric acid with sodium bicarbonate, concentrating the solution and crystallizing. Official in Belg., Gr., Sp. and Nedl.

Sodium Citrate. $2\text{Na}_2\text{C}_6\text{H}_5\text{O}_7 + 11\text{H}_2\text{O}$. This was made official in the 8th revision of the U. S. P. It was already official in a few European pharmacopœias. It may readily be prepared by saturating a solution of citric acid with sodium bicarbonate, filtering and evaporating to dryness or stirring to granulate. See Part II.

Sodium Dithiosalicylate. A grayish-white powder, soluble in water, prepared by the interaction of dithiosalicylic acid with sodium salt; given as an antirheumatic and antiseptic in doses of 3 grains. Also used in veterinary practice, in 5 percent. solution, as a lotion for foot and mouth diseases.

Sodium Ethylate. This salt may be prepared the same as Potassium Ethylate, by heating together ethyl acetate and metallic sodium. It is used as a caustic.

Sodium Formate. This occurs in small, white, deliquescent crystals, soluble in water and glycerin, prepared by neutralizing formic acid with soda and crystallizing. This salt is recommended in surgical tuberculosis (parenchymatous), by hypodermic injection; for children $\frac{2}{3}$ to $1\frac{1}{2}$ grains every 3 to 10 days; for adults 10 grains.

Sodium Glycerinophosphate. A yellowish liquid recommended as a nerve tonic and reconstructive in neurasthenia, phosphaturia etc., prepared in the same manner as calcium glycerinophosphate. See Glycerinophosphates. Given by hypodermic injection in solution of salt water, 3 to 4 times daily. Also in Elixirs, Syrups etc.

Sodium Hydroxide. U. S. NaOH . Soda. Caustic Soda. This is official in part of the pharmacopœias, under different titles. The common caustic soda is prepared by several processes of reduction and is now being prepared commercially by the electrolysis of solutions of common salt. It is extensively used in the industrial arts for various purposes. It is furnished by the manufacturers in drums or smaller packages, and in solid mass or granulated. The caustic soda that is furnished in 1lb cans, is 98% soda and sufficiently pure for most purposes. In making chemicals, soap etc., soda is considerably used in the operations of pharmacy.

Sodium Hypophosphite. $\text{NaPH}_2\text{O}_2 + \text{H}_2\text{O}$. This is official in the U. S., Br. and a few of the European pharmacopœias. The method of preparing it and its uses are given in Part II.

Sodium Iodate. NaIO_3 . By the interaction of a solution of potassium chlorate with a solution of sodium iodide. It is a white powder, soluble in water, and is used as a substitute for potassium iodide. Dose 1 to 2 grains. Also applied externally in solution or ointment, 2 to 10 percent.

Sodium Iodide. NaI . This is official in the U. S., Br. and many other pharmacopœias. It may be prepared in the same manner as potassium iodide, but using sodium hydroxide instead of potassium iodide. It is considerably used in medicine as an alternative. See Part II.

Sodium Lactate. This may be made by diluting lactic acid with 3 parts of water and saturating, while boiling with sodium bicarbonate, then evaporating. Official in Belg. Ph.

Sodium Meta-Vanadate. By the interaction of vanadic acid and metallic sodium, and heating the solution for some time until it is reduced to a powder. The action is similar to that of arsenic. The dose is $\frac{1}{20}$ to $\frac{1}{5}$ grain.

Sodium Methylarsenate. The same as sodium cacodylate, which see.

Sodium Lactophosphate. By neutralizing lactophosphoric acid with sodium bicarbonate and carefully evaporating the solution.

Sodium Naphtolate. Microcidin. A whitish powder prepared by the interaction of β -naphtol with soda, soluble in three parts of water. Used as a surgical antiseptic in solution of 5 to 10 percent.

Sodium Nitrate. NaNO_3 . Official in the U. S. and in several of the foreign pharmacopœias, but not in the Br. This is a salt of great industrial importance, being found native in Chili and Peru and quite generally known as "Chili Saltpetre." It is extensively used in the production of nitric acid and many of the nitrate chemicals. In medicine its uses are the same as potassium nitrate. See Part II.

Sodium Nitrite. NaNO_2 . This is official in the U. S., Br. and a few European pharmacopœias. In pharmacy it is used for the production of nitrous ether and some other preparations. See Part II.

Sodium Nucleinate. A white powder almost completely soluble in water. The sodium salt of yeast nuclein. It is administered subcutaneously to stimulate nutrition or nutritive processes.

Sodium Oxalate. By adding to a hot, concentrated solution of oxalic acid solution of soda until neutral, and allowing to crystallize.

Sodium Para-creosote. A bitter powder, soluble in 24 parts hot water. An antipyretic recommended for acute rheumatism, pneumonia and typhoid fever; also an antiseptic for infants' intestinal catarrh etc. Dose 2 to 20 grains, according to age etc., best given in solution with flavored syrup.

Sodium Permanganate. This is prepared by neutralizing a solution of permanganic acid with soda. Used extensively as an antiseptic cleansing application for ulcers, gangrene etc., usually in aqueous solution.

Sodium Perborate. $\text{NaBO}_2 + 4\text{H}_2\text{O}_2$. This is a white, granular salt, which evolves hydrogen peroxide upon the addition of water. It should contain not less than 9 percent. of available oxygen.

Sodium Peroxide. This is a white, odorless, granular salt which, when combined with water, evolves hydrogen peroxide, forming a solution like the official. It is also made into a soap known as peroxide soap and is otherwise employed to administer hydrogen peroxide. It should contain not less than 75 percent. of Na_2O_2 .

Sodium Persulphate. $\text{Na}_2\text{S}_2\text{O}_8$. This is a high oxidation product of sodium with sulphuric acid. It is furnished in the form of solution known as **persodine**. It is used as an internal antiseptic and oxidizer in tuberculous cancer.

Sodium Phenolsulphonate. $\text{NaC}_6\text{H}_4\text{SO}_3\text{S} + 2\text{H}_2\text{O}$. This was official in the 7th revision of the U. S. P. as Sodium Sulphocarbolate, but the title was changed as above in the 8th. The method of preparing it and its uses will be found in Part II.

Sodium Phosphate. $\text{Na}_2\text{HPO}_4 + 12\text{H}_2\text{O}$. This is official under similar names in all pharmacopœias. It is one of the most commonly used medicinal salts of sodium. It is prepared in several forms which will be noticed, together with their uses, in Part II.

Sodium Pryophosphate. $\text{Na}_4\text{P}_2\text{O}_7 + 10\text{H}_2\text{O}$. This is official in the U. S. and in several European pharmacopœias, but not in the Br. The method of preparing it and its uses will be found in Part II. A ferrated sodium pyrophosphate is official in several European pharmacopœias. This will be further noticed in Part II.

Sodium Salicylate. $\text{NaC}_7\text{H}_5\text{O}_3$. This is official in nearly all countries. It is extensively used in medicine as a remedy for rheumatism. The method of its preparation and its uses are given in Part II.

Sodium Santoninate. This is official in a few European pharmacopœias. It may be prepared by adding to 4 fl.ounces of solution of soda 1 fl.ounce of water, and adding to the solution 1 ounce av. of santonin, then heating and stirring until the salt is dissolved, filtering, evaporating and crystallizing. This salt is sometimes used instead of santonin, being more soluble. The dose is 1 to 3 grains.

Sodium Silicate. Na_2SiO_3 . By mixing 1 part of silica with 2 parts of dried sodium carbonate, and fusing in an earthenware crucible, and dissolving the mass, when cool and in powder, in water, then filtering, concentrating and crystallizing. The solution of this salt is known as water-glass. (Liquor Sodii Silicatis).

Sodium Silicofluoride. A white, inodorous, tasteless powder, non-toxic and non-irritant. An antiseptic, deodorant and styptic, used as an application 1:5000 for gonorrhœal injection, cystitis, wounds etc.

Sodium Sozoiodolate. This is a compound of sodium with sozoiodol, used chiefly as a substitute for iodoform. It is more fully described in Part II.

Sodium Succinate. By neutralizing succinic acid with solution of soda, concentrating and crystallizing.

Sodium Sulphate. $\text{Na}_2\text{SO}_4 + 10\text{H}_2\text{O}$. Glauber's Salt. This is official in all pharmacopœias and is prepared by the interaction of sulphuric acid and sodium carbonate. It is obtained as a by-product of the manufacture of other chemicals and is used in making other sodium salts and as "physic" for horses and cattle. It acts as a cathartic for human beings in doses of $\frac{1}{2}$ to 1 ounce, and is preferred by many to Epsom Salts, for a similar purpose.

An Effervescent Sodium Sulphate is official in the Br. See Part II.

Sodium Sulphite. $\text{Na}_2\text{SO}_3 + 7\text{H}_2\text{O}$. This salt is official in the U. S. and Br. pharmacopœias. It is used in the preparation of some pharmaceuticals and as an anti-ferment. It will be more fully described in Part II.

Sodium Sulphide. A true combination of sodium and sulphur in equivalent proportions, used chiefly for testing.

Sodium Sulphocarbolate. This still appears by this name in the Br. and Nedl. S., but the name of the same preparation was changed in the U. S. to Sodium Phenolsulphonate, which see.

Sodium Sulphoichthyolate. This is official in several European pharmacopœias, and is generally known as Ichthyl Sodium to distinguish it from Ichthyl Ammonium. See Ichthyl, Part II.

Sodium Sulphosalicylate. A crystalline powder of a sour, astringent taste, readily soluble in water. An antirheumatic, uses similar to sodium salicylate.

Sodium Sulphovinate. A white, granular powder or crystals, very deliquescent and soluble in 0.7 part of water. It is employed as a mild, but active saline cathartic. Dose for children 2 to 3 drachms, for adults 5 drachms.

Sodium Tannate. This is prepared by mixing a solution of sodium carbonate with a solution of tannic acid, and collecting the precipitate. It has no important uses in medicine.

Sodium Tartrate. $\text{Na}_2\text{C}_4\text{H}_4\text{O}_6 \cdot \text{H}_2\text{O}$. By dissolving 12 parts of tartaric acid and 15 parts of sodium bicarbonate, each separately in sufficient water, mixing the solutions, filtering, concentrating and crystallizing.

Sodium Tellurate. A combination of sodium and tellurium, sometimes used in medicine to prevent sweating. Dose $\frac{1}{2}$ grain, in pill.

Sodium Tetraborate. A neutral combination of sodium and boric acid, soluble in 6 parts of water. Used externally, like boric acid, as an antiseptic.

Sodium Thiosulphate. $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$. Formerly known as Sodium Hyposulphite. It is official in the U. S. and part of the European pharmacopœias, but not in the Br. It is prepared from alkali waste by decomposing its soluble calcium sulphate with sodium sulphate or carbonate. It is used in photography and some other arts and in medicine as an alterative and resolvent in dose of 10 to 30 grains. See Part II.

Sodium Tungstate. (Wolramate). By neutralizing tungstic acid with solution of soda, concentrating and crystallizing.

Sodium Uranate. A decomposition product of a sodium salt with a salt of the metal uranium. This is used chiefly as a chemical test.

Sodium Valerate. $\text{NaC}_5\text{H}_9\text{O}_2$. This was formerly official in the Br. P. but was dismissed. It will be further considered in Part II.

Some other salts of sodium are used for various purposes, as Sodium Aluminate and Sodium Stannate, as mordants for dyeing, and many double salts of sodium are known, but are little used in pharmacy.

Sodium, being so strongly basic, combines with all acids and forms a great number of salts. Most of the important compounds are noted in the foregoing list, but many others, very little used, are quoted in chemical catalogues and need not be noticed here.

STRONTIUM.

Sym. Sr; at. wt. ($\text{O}=16$) 87.63; sp. gr. 2.54; bivalent; characteristics like calcium and barium. It is chiefly obtained from strontianite, SrCO_3 , and celestite, SrSO_4 . The metal is produced by electrolysis from fused strontium chloride.

The salts of strontium are used in pyrotechnics for making red-fire and some of them are used in medicine. In periodic arrangement it is in Group II, Series 6, being of the same family as calcium and barium, and classed with the alkaline earths. The metal was isolated by Davy in 1808, but only occurs in nature in its compounds. Its properties are very similar to calcium in most particulars except that its hydroxide is more soluble than calcium hydroxide, and its sulphate is less soluble than calcium sulphate. Its nitrate is insoluble in alcohol, while calcium nitrate dissolves in it. These three differences make it possible to separate strontium from calcium salts.

Strontium nitrate is the salt generally used in pyrotechnics. This is prepared in granular form and when ignited by mixing it with some substance that will maintain the combustion as sulphur, shellac, dried sawdust or charcoal, it makes an intensely crimson fire. Some of the other strontium salts are used in medicine. See Part II.

Strontium Salts.

The following strontium salts are known and most of them used for one purpose or another. Some of them have been recently introduced in the pharmacopœias, three being official in the U. S. P. The official salts will be further considered in Part II.

Strontium Acetate. Neutralize acetic acid with strontium carbonate, evaporate and crystallize.

Strontium Arsenite. By the interaction of arsenic acid and a strontium salt. It is used as an alterative; dose $\frac{1}{30}$ to $\frac{1}{15}$ grain, usually in pills.

Strontium Bromide. $\text{SrBr}_2 \cdot 6\text{H}_2\text{O}$. It is official in the U. S. and Fr. pharmacopœias. This salt has lately come into prominence in the treatment of

epilepsy, and some forms of nervous diseases. It is prescribed in doses of 5 to 15 grains. It is soluble in 1.05 parts of water at N. T., and in 0.5 part of boiling water. It is also soluble in alcohol. <U. S.

Strontium Carbonate. SrCO_3 . This may be prepared by adding a solution of sodium carbonate to a solution of strontium nitrate and collecting the precipitate. It is official in the Fr. Ph.

Strontium Chlorate. This salt is considerably used in pyrotechnics, and in medicine it may be employed instead of potassium chlorate, when indicated.

Strontium Chloride. This may be prepared by neutralizing diluted hydrochloric acid with strontium carbonate, concentrating and crystallizing.

Strontium Iodide. $\text{SrI}_2 + 6\text{H}_2\text{O}$. Official only in the U. S. This salt has also lately come into use for the treatment of albuminuria, rheumatism etc. The dose is from 3 to 10 grains. It is soluble in 0.6 part of water at N. T., and in 0.27 part of boiling water. It is also soluble in alcohol.

Strontium Lactate. $\text{Sr}(\text{C}_3\text{H}_5\text{O}_3)_2 + 3\text{H}_2\text{O}$. This strontium salt has met with favor for uses similar to the bromide and iodide. The dose is from 3 to 10 grains. Soluble in about 4 parts of water at N. T., and in about 0.5 part of boiling water, also soluble in alcohol. It is official in the Fr. Ph.

Strontium Nitrate. Sr_2NO_3 . This is made by saturating nitric acid with strontium carbonate, concentrating the solution and crystallizing or stirring while evaporating to granulate. It must be dried by very gently heat. It is used in making red fire for pyrotechnics and theatrical illuminations.

Strontium Oxalate. By adding strontium carbonate to a solution of oxalic acid until neutralized and collecting the precipitate.

Strontium Oxide. SrO . This is obtained by igniting strontium nitrate and collecting the residue.

Strontium Peroxide. By combining a larger quantity of oxygen with strontium oxide, and adding to the peroxide, when formed, an equal quantity of strontium oxide.

Strontium Phosphate. By adding strontium carbonate to phosphoric acid, until neutralized, and crystallizing.

Strontium Salicylate. $\text{Sr}(\text{C}_7\text{H}_5\text{O}_3)_2 + 2\text{H}_2\text{O}$. This is official only in the U. S. P. It may be prepared by adding strontium carbonate to a hot, concentrated solution of salicylic acid until effervescence no longer occurs, then filtering and concentrating by evaporation to dryness, and pulverizing. It is highly recommended as a remedy for rheumatism and the elimination of uric acid. Average dose 1 gm. (15 grains).

Strontium Sulphate. SrSO_4 . This may be made by adding sulphuric acid to a solution of strontium nitrate. Strontium sulphate is precipitated.

Strontium Sulphide. By heating together metallic strontium and sulphur, until thoroughly combined. Its properties are similar to calcium sulphide.

Strontium Tartrate. This may be prepared by adding strontium carbonate to solution of tartaric acid, until neutralized, and crystallizing.

SULPHUR.

Sym. S; at. wt. (O=16) 32.07; sp. gr. varies according to allotropic form, native sulphur being 2.05, melted sulphur (brimstone) about 1.98, amorphous sulphur about 1.95; bivalent, sexivalent, depending upon temperature; melts at 114.5°C .; boils at 445°C . giving an orange-colored vapor. At -80°C . sulphur is colorless; it dissolves slightly in alcohol but is insoluble in water, in sulphurous and sulphuric acids.

Sulphur combines directly with many of the elements, both metals and non-metals. The halogens and hydrogen unite with it directly and many of the metals and non-metals unite with it vigorously when heated. With oxygen it forms several most important compounds, the most important being sulphur dioxide, SO_2 , and sulphur trioxide, SO_3 ; the solution of these gaseous oxides in water form sulphurous and sulphuric acids.

In periodic arrangement sulphur is in Group VI, Series 3, classed with selenium and tellurium. It has been known since the beginning of civilization and occurs native in most countries in which volcanoes exist or have existed,

being a product of the action of heat on sulphur compounds existing in rock formation in the vicinity of volcanoes.

It is extensively employed in the industries in the manufacture of gun powder, vulcanized rubber and in making matches, and its acids are among the most important in chemistry. When burned it is a deodorizer and disinfectant, destroying disease germs and deleterious emanations; it is also a powerful bleaching agent when ignited.

As many of the sulphur compounds are employed in medicine they will be further noticed under Sulphur in Part II.

Forms of Sulphur.

Sulphur is found in three different forms on the market. Sublimed sulphur, roll sulphur and precipitated sulphur, all of them having their uses in the arts and in pharmacy. It combines directly with several of the elements, forming sulphides or sulphurets, which vary in their union with other bodies, some of them acting as bases and some as acids.

Sublimed Sulphur. Flowers of Sulphur. This is sulphur as it occurs, when the vapor of sulphur is conducted into properly constructed chambers after being sublimed. This is commonly known as sulphur, commercially and in pharmacy.

Washed Sulphur. A formula for this is official in the U. S. and other pharmacopœias. The object is to free the sulphur from sulphurous acid.

Precipitated Sulphur. This is commonly known as Lac Sulphur. A formula for this is official in the U. S. and other pharmacopœias. The object is to free it from impurities and to make it finer and softer than the sublimed sulphur. See Part II.

Other Forms of Sulphur.

Amorphous Sulphur. Sulphur Fuscum. Brown Sulphur. Red Sulphur. This is prepared from sublimed sulphur by melting it, increasing the heat to from 320° to 350° F., and continuing at that temperature for about half an hour, or until it becomes brown and viscid, then pouring into water. In this state it is ductile and easily moulded like wax, but does not become fluid until heated to over 600° F.

Roll Sulphur or Brimstone. This is crude sulphur purified by melting, skimming and pouring it into moulds. It is used extensively for bleaching, burning more readily than sublimed sulphur, and as a cement for setting stone and many other purposes. It is seldom employed in medicine because of its impurities.

Sulphur Vivum. Black Sulphur. Crude Sulphur. Horse Brimstone. This is crude native sulphur, a gray or mouse-colored powder. It is seldom found in the market—the residuum of the subliming pots being substituted for it. It contains quite a large percentage of arsenic, and is therefore not used except for horses and stock.

Salts of Sulphur.

Sulphur iodide is the only official salt in which sulphur acts as the basic substance. The formula for its preparation and its uses are given in Part II. Sulphur forms compounds, however, with the other halogen elements, bromine—Bromide of Sulphur, S_2Br_2 , and with chlorine—Chloride of Sulphur, S_2Cl_2 , but they are seldom used.

With most of the positive elements sulphur combines, forming sulphides or sulphurets, which are noticed under the basic elements with which the combination is made. The name "hepar" was given by the old chemists to the liver-colored combinations formed by the union of sulphur with antimony, potassa, soda, calcium etc. It is still retained in homœopathic pharmacy, hepar sulphuris or hepar sulphur (calx sulphurata), hepar sulphuris kalinum (sulphuretted potash), being the official titles in their pharmacopœias.

Acids of Sulphur.

Sulphur forms combinations with hydrogen and oxygen as follows:

Hydrogen Sulphide. Sulphuretted Hydrogen. H_2S . This is an inflammable gas occurring in nature and produced by the decomposition of substances

containing sulphur. It may be conveniently prepared by decomposing ferrous sulphide with sulphuric acid diluted with water. This gas is extensively used in chemical laboratories in the manufacture of chemicals.

Hydrogen Persulphide is an oily fluid similar in properties and uses to hydrogen peroxide.

With oxygen sulphur forms two oxides which are known as sulphurous and sulphuric anhydrides, and which unite with the elements of water, making sulphurous and sulphuric acids.

Sulphurous Acid. H_2SO_3 . When sulphur is burned in the atmosphere, gaseous sulphurous anhydride or oxide, SO_2 , is formed, which when dissolved in water produces sulphurous acid. The sulphurous acid of the market contains about 5 percent. or less of the gas. The salts formed with this acid and bases are called Sulphites. (See Acidum Sulphurosum).

Sulphuric Acid. H_2SO_4 . Oil of Vitrol. This acid is now mostly made by roasting iron pyrites or bisulphide of iron or other sulphides, the metals of which have a commercial value. The sulphur contained in the compounds is converted into sulphuric acid by distilling its vapor which consists of sulphuric anhydride or oxide, SO_3 , which unites with the elements of water forming sulphuric acid. This acid is extensively used in various manufacturing industries and in pharmacy. (See Acidum Sulphuricum). The salts formed with this acid and bases are called sulphates.

Besides these acids formed from the oxides of sulphur, Hyposulphurous Acid, H_2SO_3 , the oxide corresponding to which has not been determined, Thiosulphuric Acid, $\text{H}_2\text{S}_2\text{O}_3$, and other acids, forming a thionic series, are known.

Sulpho-Acids. Sulphuric acid unites with some other acids, forming a class of sulpho-acids.

Sulpho-Carboic Acid. $\text{HC}_6\text{H}_5\text{SO}_4$. This is made by mixing equivalent weights of sulphuric and carboic acids. It is obtained from its solution as a solid by crystallization. This acid forms with metallic bases a class of salts known as Sulphocarbonates, as calcium sulphocarbonate, $\text{Ca}(\text{C}_6\text{H}_5\text{SO}_4)_2$, copper sulphocarbonate, $\text{Cu}(\text{C}_6\text{H}_5\text{SO}_4)_2$, iron sulphocarbonate, $\text{Fe}(\text{C}_6\text{H}_5\text{SO}_4)_2$, sodium sulphocarbonate, $\text{Na}(\text{C}_6\text{H}_5\text{SO}_4)$, potassium sulphocarbonate, $\text{KC}_6\text{H}_5\text{SO}_4$, ammonium sulphocarbonate, $\text{NH}_4\text{C}_6\text{H}_5\text{SO}_4$, zinc sulphocarbonate, $\text{Zn}(\text{C}_6\text{H}_5\text{SO}_4)_2$ etc. These salts are also known as phenylsulphonates.

Sulphocyanogen. This is a compound made by the union of sulphur and cyanogen, acting as an acid and forming with some bases salts known as Sulphocyanides.

Sulphoricinic Acid. This is prepared by heating together at a temperature not exceeding 50°C . (122°F .), castor oil 10 parts and sulphuric acid 3 to 4 parts, both by weight, then after time has been given for the reaction to occur, adding water which causes the uncombined oil with the acid to separate in an oily layer at the top, leaving a layer of aqueous solution of acid beneath. The acid combines with alkalies, forming a class of salts called sulphorinates.

Sulphovinic Acid. $\text{C}_6\text{H}_5\text{SO}_4$. This acid is formed by the union of sulphuric acid with the ethylic alcohol radical before the formation of ether is completed. The salts of this acid are called Sulphovinates, or Sulphethylates, as calcium sulphethylate, copper, potassium, sodium etc. sulphethylates.

TANTALUM.

Sym. Ta; at. wt. ($\text{O}=16$) 181.0; sp. gr. 7.02; trivalent and pentavalent; malleable and ductile, producing wire of greater tensile strength than steel and being used in electric incandescent lamps instead of carbon filaments.

This metal is of uncommon occurrence, and is but little known. It occurs in the same family and is obtained from the same source as vanadium and niobium; having characteristics similar to them and being in Group V. Series 10, of periodic arrangement.

Tantalum was made known by Hatchett, an English chemist, in 1801. The metal is a black powder very little acted upon by most chemical reagents, although in intense heat it forms carbide, and absorbs hydrogen freely. It

is known to form compounds with fluorine, chlorine and bromine, and an iodine combination is not improbable. It also forms oxides, when heated in oxygen. It has no present use in medicine.

TELLURIUM.

Sym. Te; at. wt. (O=16) 127.5; sp. gr., crystalline, 6.39 at 20°C., amorphous, 5.928; bivalent and sexivalent; melts at 452°C.; distils above melting point, sp. gr. of vapor at 1,300°C., 8.743 (air=1).

A silvery metal having a metallic luster. It crystallizes in rhombohedral forms, the crystals being brittle. It burns in the air with a blue flame being converted to its oxide, TeO_2 . It forms compounds with hydrogen, chlorine, bromine and oxygen and probably with some other elements. In periodic arrangement it is in Group VI, Series 7, associated with oxygen, sulphur and selenium. Tellurium was discovered by Reichenstein, a German chemist, in 1782, and was obtained chiefly from Transylvania and in the Altai Mountains for a century; but it was then discovered in the gold and silver ores of Colorado in considerable quantities, and the telluride ores of Colorado became famous.

In its amorphous condition it is a black powder called graphic tellurium.

As will be seen by its composition it forms both direct combinations with oxygen; and acids, by the introduction of hydrogen. Tellurous acid, H_2TeO_3 , is prepared by fusing the metal with soda and saltpetre and separating the acid from the tellurate formed.

Tellurium and its salts are recognized in mining operations, but are not used in medicine.

It is closely related to selenium and is associated with it and other metals in the "anode muds" which are deposited in the electrolytic refining of copper. These slimes or muds contain silver, gold, lead, arsenic, antimony, bismuth, selenium and tellurium. They are collected, put in huge fire-brick cupels and subjected to a high heat with an air-blast. All but the gold and silver are oxidized and separated either as slag or flue-dust, which contains tellurium oxide. Various salts of tellurium are known but, as yet, have no valuable application.

Telluride hydride. H_2Te . This may be produced by the action of hydrochloric acid on zinc telluride. It precipitates tellurides from their compounds with heavy metals in solution.

Tellurium dioxide. TeO_2 . This is found when tellurium is burned in the air or oxygen.

Tellurous acid. H_2TeO_3 . Produced by dissolving tellurium in nitric acid.

Telluric acid. H_2TeO_4 . Produced by fusing the metal or dioxide with soda and saltpetre and separating the acid from the tellurate formed. Its properties are but slightly acid. With organic compounds tellurium produces a very disagreeable odor, so intense that chemists who work making them have to burn the clothing worn at the time.

TERBIUM.

Sym. Tb; at. wt. (O=16) 159.2.

This is one of the very rare metals, found among the rare earths associated with yttrium and other elements, and but recently included in the elementary list and assigned a place in the periodic system in Group IV, Series 9. It was discovered by Mosander, a Swedish chemist, in 1843, but has received little attention since then. It seems, simply, to fill a place in the chemical construction of the universe, but has no known use at the present time.

THALLIUM.

Sym. Tl; at. wt. (O=16) 204.0; sp. gr. 11.8; trivalent; (also univalent) melts at 290°C.; at a high heat it burns with a brilliant green flame. It oxidizes on the surface when in moist air, but does not decompose water at ordinary temperatures. Is readily dissolved in nitric and sulphuric acids, but is little affected by hydrochloric acid.

It is a white, soft metal like sodium, with a bluish metallic color like lead. It is obtained chiefly from zinc blende, which when roasted in sulphuric acid gives off thallium with the fumes which settle in the flue dust and chamber-mud and is obtained from these deposits by boiling with dilute sulphuric acid and precipitating with hydrochloric or hydriodic acid, by which sparingly soluble chloride or iodide are deposited from which by reduction the metal is produced.

Thallium is classed with gallium and indium in the aluminum Group III, Series 11. It was discovered by Crookes, the English chemist, in 1862. Its characteristics are similar to mercury, silver and lead, and aside from its combination in zinc blende it is found in iron and copper pyrites and in native sulphur. With oxygen it forms two oxides, thallous oxide, Tl_2O , and thallic oxide, Tl_2O_3 . It also unites with chlorine, forming four chlorides and with bromine, iodine, sulphur and phosphorus, forming thallous and thallic salts.

Thallium unites with the acids in the same manner as other basic elements. Thallium acetate is recommended for phthisical night-sweats; dose $1\frac{1}{2}$ to 3 grains; the bromide, carbonate, chloride, iodide, nitrate, phosphate and sulphate of thallium are quoted in chemical lists, but are seldom used in pharmacy or medicine.

THORIUM.

Sym. Th; at. wt. (O=16) 232.0; sp. gr. 7.7. This rather rare metal is associated with titanium and zirconium, and related to carbon and silicon, forming, with oxygen, basic oxides which make it particularly valuable in combination with cerium, for incandescent mantles which are made by saturating finely woven muslin forms with a solution of thorium and cerium nitrates in such proportion that, after ignition the ash will contain from 98 to 99 percent. of thorium oxide (thoria) with 2 to 1 percent. of cerium oxide (ceria). It will thus be seen that thorium is very important as being the chief mineral used in making incandescent mantles so much used at the present time for gas lighting.

In periodic arrangement thorium is in Group IV, Series 12, classed with radio-active metals radium and uranium. It was discovered by Berzelius, the Swedish chemist, in 1828, and is chiefly obtained from monazite sand, which is found in the U. S., Canada and Brazil. Auer von Welsbach made use of this element in making mantles for incandescent gas lighting and it has come into great prominence because of its use for this purpose. It is also used in combination with yttrium, cerium and zirconium, in the Nerst incandescent electric light, which is constructed on a different principle from ordinary electric lighting.

This metal unites with oxygen forming an oxide, ThO_2 , and the hydroxide $Th(OH)_4$, also with fluorine, chlorine and sulphur, but its principal salt is the nitrate, which is used for mantles.

Thoria and **Ceria** in the form of solution of nitrates of thorium and cerium, in such proportion that, after ignition the ash contains from 98 to 99 percent. of thoria with 2 to 1 percent. of ceria, form the incandescent mantles used for gas-lights. Finely woven cotton forms are made and dipped into the solution of these nitrates; when ignited, the cotton burns, leaving the ash skeleton of the metallic oxides.

THULIUM.

Sym. Tm. at. wt. (O=16) 168.5. This is one of the rare earths, which has but recently been admitted into the list of elements and assigned a place in the periodic system. It is associated with other rare earths found principally in Sweden and Greenland. In period arrangement it is in Group I, Series 10.

Thulium was discovered by Cleve, a Swedish chemist, in 1879. Further than its association with the rare earths it is of no present industrial or medicinal value.

TIN. (Stannum).

Sym. Sn (Stannum); at. wt. (O=16) 119.0; sp. gr. 7.293 at $13^\circ C.$; quadrivalent; melts at $232.7^\circ C.$; volatilizes between 1450° and $1600^\circ C.$ A white, lustrous metal having a quadratic crystalline structure, which is shown when

moistened by hydrochloric acid; harder than lead, softer than gold, very ductile and malleable, can be beaten into tin foil or rolled into thin sheets; at 200°C. it becomes brittle and when kept for a long time at a low temperature it is converted into a brittle gray modification of only 5.8 sp. gr. Upon heating, the color and sp. gr. are restored. At ordinary temperature it is not affected by air, but upon heating it in air it oxidizes and if burned in air it is converted into an oxide. It forms alloys with many of the metals. Solder is an alloy of tin and lead, half and half, being the favorite proportion. Copper alloys with tin, forming bronzes, gun metal contains copper 90%, tin 10%; bell metal contains copper 75 to 80% with 25 to 20% of tin. Phosphor bronze is prepared by fusing copper with tin phosphide in varying proportions, according to the use for which it is required. Silicon bronze contains silicon in place of phosphorus. Tin amalgam is made with tin foil and mercury. This is used as the metallic coating for mirrors, sheets of tin foil being spread upon the glass and mercury poured upon it.

Tin plate, or sheet tin, is sheet iron coated with melted tin, the iron being first prepared before dipping in the molten metal. This is very extensively used for making tin ware and for building purposes. As tin is not affected by water or ordinary mineral or carbonated waters it is extensively used for making tin pipe, or tubing, commonly called block-tin pipe. When tin is bent it gives a peculiar crackling sound, which distinguishes it from other metals. In periodic arrangement it is classed in the tin group with titanium, zirconium and thorium, having similar characteristics; Group IV, Series 7.

Tin is not very widely distributed, the principal mines being located at Cornwall in England, and on the group of islands lying east of Sumatra. Some tin is also found in the United States, in Colorado. In Europe the metal occurs mostly in the form of tin-stone, cassiterite, SnO_2 . This ore is roasted to free it from arsenic and sulphur and then reduced by smelting it with charcoal or coke. It comes to the market in pigs, but is furnished to the trade in 1lb. bars. In the form of tin foil (which is generally composed with a large proportion of lead), it is used in great quantities for wrapping packages, to protect them from moisture, and for bottle-caps and capsules in putting up various liquors, fruit juices and food products. The chemical compounds of tin will be noticed further in Part II under the title "Stannum."

In chemistry and pharmacy Tin is known by its Latin name **Stannum**. Forms of tin used in pharmacy are known as

Stannum pulveratum. Pulverized tin. Official in the Fr. Ph. under the name *Étain en poudre*.

Stannum raspatum. Rasped tin. Official in the Greek Ph.

Granulated tin. (Grain tin), and **Flossed tin** are commercial forms suitable for making tin chloride solution or other compounds in which tin is dissolved in an acid.

Tin-foil cannot be depended upon as pure tin, as it is, generally, largely alloyed with lead.

Tin Salts and Compounds.

The following are the salts and compounds of tin generally used. Tin has, at present, no medicinal value.

Tin Chloride. Stannous Chloride. SnCl_2 . An anhydrous salt is made by distilling together a mixture of tin and mercury chloride. A hydrate or crystallized salt is made by boiling tin in excess with hydrochloric acid, the liquid may be poured off and evaporated to a granular salt.

Stannic Chloride. SnCl_4 . This is made by dissolving grain tin in a mixture of 2 measures of hydrochloric acid with 1 measure each of nitric acid and water. The solution evaporated to granulation is known as "Salts of Tin," used for dyeing. Solution of tin chloride (stannic chloride) is also much used for dyeing. This is known as "Spirits of Tin." It is also used as an flux for soldering. This is known commercially as solution muriate of tin.

Tin Hydrates. Hydrated Tin Oxide. $\text{Sn}(\text{HO})_2$. This is made by precipitating stannous chloride with potassium carbonate, and washing the precipitate. Hydrated tin peroxide, or stannic acid, $\text{Sn}(\text{HO})_4$, is made by

adding potassium carbonate to a solution of stannic chloride, and washing the precipitate.

Tin Iodides. Tin Protiodide, SnI_2 . This is prepared by heating tin and iodine together. Stannic iodide, SnI_4 , is made by dissolving tin in hydriodic acid and crystallizing.

Tin Mordants. A great variety of these are used for dyeing; different combinations being used for different purposes. For cochineal, a mixture of nitric acid and water, each, 2 pounds, sal ammoniac 2 ounces, dissolved, and $4\frac{1}{2}$ ounces of pure tin, gradually dissolved in the liquid. For madder, nitric acid 8 parts, common salt 1 part, water 8 parts, tin 1 part. This is the common "Tin Spirit" used by dyers. Various other combinations are used.

Tin Oxides. Stannous Oxide, SnO . This is made by igniting the hydrate of tin in an atmosphere of carbon anhydride. Stannic oxide is prepared by the action of nitric acid on metallic tin and washing the powder with water. It is also prepared by heating tin above its melting point in air. It is known as Polisher's Putty, and is used for polishing tinware and other substances.

Tin Sulphides. Stannous Sulphide, SnS . This is made by heating tin and sulphur together. Stannic Sulphide, SnS_2 , known also as bronze powder, mosaic gold etc., is made by melting tin 12 ounces, and adding mercury 6 ounces, allow to cool and add ammonium chloride 6 ounces, sulphur 7 ounces, and after thoroughly mixing, heating in a glass flask by a sand-bath for several hours to redness until white fumes cease to rise. This is used as a substitute for gold in bronzes, varnishes, sealing wax etc.

Different degrees of gold color may be given to the bronze by using different proportions of the ingredients.

Several other salts and solutions of tin are known and may be had of chemical manufacturers, but are seldom used in pharmacy.

TITANIUM.

Sym. Ti; at. wt. (O=16) 48.1; sp. gr. 4.87; very difficultly fusible, and very hard as compared with other elementary metals.

This is one of the rare elements related to carbon and silicon, but classed with zirconium and thorium in the rare earths found in the silicates. The element may be obtained by the reduction of its oxide with aluminum.

Its oxide is found in three forms, in rutile, anatase and brookite. The metal is white, but its trioxide, TiO_3 , has characteristics similar to silicic and stannic acids. Many compounds of titanium may be produced, but commercially and in medicine it has no immediate use.

Titanic Acid. $\text{Ti}(\text{OH})_4$. When a hydrochloric acid solution of titanium is treated with ammonia, this acid separates as a white powder.

Titanium Chloride. TiCl_4 . This may be prepared by passing chlorine gas over a red-hot mixture of titanium dioxide and charcoal.

Titanium Dioxide. TiO_2 . This occurs native in three forms of ores as above mentioned.

Titanium forms compounds with other acids, but they are little known and of no chemical importance.

TUNGSTEN.

Sym. W (Wolframium); at. wt. (O=16) 184.0; sp. gr. 16.6 (pure); sexivalent; very hard, brittle; very difficultly fusible; crystallizes in quadric form. A heavy gray metal, forming a great variety of compounds. In nature it occurs as tungstates, and is found chiefly in Sweden in the mineral known as wolfram, from which it may be obtained by reduction of pure tungstic acid with aluminum filings. It is permanent in air and is but slightly acted upon by the mineral acids or aqua regia, but in a mixture of nitric and hydrofluoric acids it dissolves rapidly. With caustic potash it combines very slowly with evolution of hydrogen gas.

In periodic arrangement it is in Group VI, Series 10, having similar characteristics as molybdenum and chromium.

Tungsten was discovered by d'Elhujar, a Spanish chemist, in 1781, but its name does not denote Spanish origin. It was not brought into prominent

notice until quite recently when it has been used to alloy steel, a small percentage greatly increasing its hardness; and as a film for electric light bulbs, greatly increasing the lighting power of the lamps and diminishing the consumption of the electric current. As tungsten salts and combinations are somewhat used in pharmacy, they will be more generally noted under the heading Tungsten in Part II.

Tungstic Acid. When a strong acid is added to a cold solution of a tungstate a white precipitate is formed, $\text{H}_2\text{WO}_4 + \text{H}_2\text{O}$. This is tungstic acid, which when combined with bases forms **Tungstates**. Tungstic acid on combination with silicic acid and a sodium base forms Tungstic Glue.

Tungstic Anhydride. WO_3 . Like chromium and molybdenum, tungsten forms an anhydride or trioxide which may be obtained by precipitating a hot solution of a tungstate with nitric acid.

Tungstic Chlorides. Four chlorides of tungsten are known to exist. WCl_3 , WCl_4 , WCl_5 , WCl_6 , the lower ones are reduced from the highest chlorine compound.

Tungstic Dioxide. WO_2 . This may be obtained by the further reduction of tungstic anhydride. It is in the form of a brown powder.

URANIUM.

Sym. U; at. wt. (O=16) 238.5; sp. gr. 18.70; sexivalent. This element has the greatest atomic weight of any known substance. It is a silvery-white metal which in the form of powder burns readily in oxygen at as low a temperature as 170°C ., changing into an oxide. It is more volatile than iron in the electric furnace. The metal is at present obtained chiefly by heating its chloride with sodium, or by electrolysis of the chloride, or by reduction of its oxide with carbon in the electric furnace. In periodic arrangement it is in Group VI, Series 12, the same series as radium and thorium. It is known as one of the radio-active metals and has recently come into considerable prominence on that account, pitchblende, its oxide, being the most available source of radium.

Uranium was discovered by Klaproth, a German chemist, in 1780, and was isolated by Peligot in 1841, but little attention was paid to it, however, until recently; although it was known to have radio-active properties it was not brought into prominence until Becquerel discovered that uraninite emitted peculiar rays and following that, the Curies discovered radium in pitchblende, its oxide. Since then uranium has been the subject of much investigation. It forms compounds with chlorine, oxygen and several other elements which are chiefly as follows:

Uranium Salts.

Uranium has stronger basic properties than molybdenum or tungsten to which it is related, and it differs from chromium by forming, with its trioxide, uranyl salts with acids. Its salts were formerly used in photography and have recently come into considerable use in connection with radio-activity.

Uranium Acetate. This may be prepared by the action of glacial acetic acid upon uranium metal in powdered form.

Uranium Chlorides. Chlorine acts upon finely divided uranium producing uranium tetrachloride, UCl_4 . This, when heated with oxygen, loses part of its chlorine and becomes uranium trichloride, UCl_3 . The tetrachloride may be again treated with chlorine by which it is partly converted into uranium pentachloride, UCl_5 . The tetrachloride is the most stable form.

Uranium Oxides. The highest form of oxidation is U_3O_8 ; it occurs thus in nature. When this is treated with nitric acid it is converted into uranyl nitrate which is derived from trioxide, UO_3 . When the uranyl nitrate is burned it leaves the trioxide as a residue. This may be reduced by hydrogen to uranium dioxide, UO_2 , and when either this or the trioxide are heated in the air the oxide, U_3O_8 , results.

Uranious Salts, in which uranium acts as a quadrivalent element, are formed as the sulphate $\text{U}(\text{SO}_4)_2$ —but few are known.

Uranyl Nitrate. $\text{UO}_2(\text{NO}_3)_2$ This may be readily prepared by treating uranium oxide with nitric acid. It crystallizes from solution in lemon-yellow prisms.

Uranyl Salts. These are derived from the hydroxide by replacing hydrogen by uranyl, UO_2 , which is bivalent.

Uranyl Sulphate. $\text{UO}_2(\text{SO}_4)$. This may be prepared by treating the nitrate with sulphuric acid.

Uranium nitride is produced when nitrogen is passed over uranium heated to 1000°C . Uranium carbide is obtained by heating uranium oxide and charcoal together in the electric furnace. This product is interesting as it yields, on the addition of water, not only methane, but liquid and solid hydrocarbons.

Other uranium salts and compounds exist, but are seldom required.

VANADIUM.

Sym. V; at. wt. (O=16) 51.06; sp. gr. 5.5; pentavalent and trivalent. This metal occurs in the nitrogen group, but in family relation with the rare metals niobium and tantalum. It was formerly supposed to be very rare, but has lately been discovered in certain iron ores and granite combinations which give it a wider range of occurrence than it was supposed to have. At present the vanadate salts are quite important as they represent a basic value, very important in fixing insoluble colors in fabrics, as in indelible inks etc. In periodic arrangement this is in Group V, Series 4, its compounds being similar to those of columbium, tantalum and didymium (?) all rare and of but limited occurrence.

Vanadium was discovered by Del Rio, a Spanish chemist, in 1801, and established as an element by Sefstrom in 1830. But little attention has been paid to it since, except that, because of its reducing properties it has proven of value in "setting" the color of indelible ink and in a like manner fixing the color of dyes on fabrics. It seems to have an action similar to lead salts in this particular, but much more energetic. It forms three classes of compounds corresponding to its oxides, and combines with chlorine, forming several compounds, also with sulphur and nitrogen.

Vanadium Compounds.

Vanadic Acid. H_2VO_4 . This is the best known of the vanadium compounds. It is a final product of the oxidation of vanadium and bears the same relation to this element as phosphoric acid does to phosphorus.

Vanadates. These are produced by the combination of vanadic acid with bases. Ammonium vanadate is the best known of these salts and is the only one used to any extent at the present time.

Vanadium Chlorides. With chlorine vanadium forms four compounds, VCl_2 , VCl_3 , VCl_4 and VCl_5 ; also an oxychloride, VOCl_3 .

Vanadium Oxides. With oxygen vanadium forms the compounds V_2O , V_2O_3 , V_2O_5 , V_2O_4 and V_2O_5 . V_2O_4 is the oxide from which the other salts are derived, by reduction or other treatment.

WATER.

By the ancients, earth, air, fire and water were the "Elements" of which all things were composed. They had no conception of the chemical composition of substances, nor their properties, other than were apparent to their sensory observation.

It was not until 1781, when Cavendish first discovered that a mixture of hydrogen and air or hydrogen and oxygen, when exploded, produced water, and in 1783, when Lavoisier repeated his experiments, that the composition of water was suspected; and it was not until several years later that water was proven to be a chemical compound of hydrogen and oxygen. The chemists of that period were so tangled up in the phlogiston theory that the true composition of water was unknown until nearly the close of the Eighteenth Century. Although water is not a chemical element, it is so closely associated with most chemical combinations and processes that it is ranked with the elements and given a prominent place with them in all chemical works.

Water is composed of hydrogen two volumes and oxygen one volume. When these two gases are mixed in this proportion and ignited by the flame of a taper or a match, or by an electric spark, they combine, with explosion, forming water, H_2O . This is **synthesis** of water from its elements. Water may be decomposed, or its gaseous constituents separated by electrolysis and in several other ways. This is **analysis**; the product of the decomposition of water is two volumes of hydrogen and one volume of oxygen, the same as was required for its synthesis. Thus the conclusion is indisputable that water is a chemical compound of H_2O and nothing else.

Expressed in terms of relative weight, water consists of 1 part of hydrogen and 7.943 parts of oxygen (usually calculated 1:8). The specific gravity of water at its greatest density, 4°C . (39.2°F .), and at 760 mm. pressure (1 atmosphere), is the unit (1) from which the specific gravity of solids and liquids are calculated. Water freezes under ordinary conditions at 0°C . (32°F .) and boils at 100°C . (212°F .). An increase of pressure lowers the freezing point at the rate of 0.0075°C . per atmosphere. When water boils it is converted into steam, expanding under ordinary pressure to 1,696 (usually calculated 1,700) times the volume of water; with increasing pressure steam has increased temperature. A litre of steam at the pressure of one atmosphere weighs 0.8064 gramme. Ice is formed at 0°C . (32°F .), but, this is not its point of greatest density, that being at 4°C . (39.2°F .); from this point water expands until it becomes ice and then, by crystallization increases considerably; one volume of water at 0°C . yielding 1.09082 volumes of ice at the same temperature. However cold ice may be it produces, in melting, a temperature no lower than 0°C . (32°F .), that of freezing water.

Above 4°C . (its greatest density) water expands, its volume increasing slightly and varying with increased temperature until it reaches its boiling point, 100°C . (212°F .). Water cannot be heated higher than its boiling point at ordinary atmospheric pressure, for at that temperature its physical condition is changed—the liquid water becomes steam, a vapor or gas, which is of the same temperature as boiling water. It requires about seven times as much heat to change water into steam as to change the same weight of ice into water and, conversely, the same amount of heat is given out when the steam changes back into water. A cubic inch of water makes nearly a cubic foot of steam at ordinary atmospheric pressure.

Water is a typical example of the three states of matter, gaseous, liquid and solid. In the form of vapor it is a constant constituent of the atmosphere; in the oceans, seas, lakes, rivers and all visible forms of its liquid state it comprises two-thirds of the surface of the earth; in the form of ice it covers vast areas; and in the form of water of crystallization it is present in a great part of the chemical compounds. In chemistry it is essential in most of the processes and combinations and as a solvent is employed in many of the operations of pharmacy, and is indispensable to all forms of life.

The compounds of water with other substances and its chemical relations to them are noted under the substances with which it combines, and need not be further explained under this heading.

XENON.

Sym. Xe; at. wt. (O=16) 130.2. This is one of the rare gases found by Ramsay and Travers in the atmosphere in 1898. It was discovered in the residue after a large quantity of liquid air had been allowed to evaporate slowly, and it was possible to separate it from krypton, which also occurs in this residue, because of difference in the vapor tension of the two substances at the temperature of liquid air, xenon's vapor being scarcely perceptible, while that of krypton was quite noticeable. Ramsay in later investigations determined that only one part by weight, of xenon, is contained in forty million parts of air. The boiling point of xenon is 163.90° absolute temperature ($= -109.1^\circ\text{C}$.). It does not combine chemically with any other element and is, therefore, nullivalent. In periodic arrangement it is the last of the Zero Group—one of the rare gases of the atmosphere.

YTTERBIUM (Neoytterbium).

Sym. Yb; at. wt. (O=16) 172.0. An element isolated by Wöhler, the German chemist, in 1828. Its oxide, Yb_2O_3 , is the chief constituent of erbia, found in euxenite and gadolinite, which also contain oxides of other rare elements, scandium, ytterium, erbium etc. In periodic arrangement it is in Group III, Series 10, having similar characteristics as other rare earths. Its salts are colorless. It has no industrial nor medicinal value.

YTTRIUM.

Sym. Y; at. wt. (O=16) 89.0.

An element obtained from the rare earths by Wöhler, the German chemist, in 1828. Its oxide may be obtained by heating the mineral euxenite and separating fractionally. It is in Group III, Series 6, closely related with other elements of the rare earths, and has, at present, no industrial or medicinal uses.

ZINC.

Sym. Zn; at. wt. (O=16) 65.37; sp. gr. 6.9 to 7.2; bivalent; melts at $433^\circ\text{C}.$; boils at $920^\circ\text{C}.$; its metallic vapor having sp. gr. 33.8 ($\text{H}=1$), therefore its molecular weight is 67.6. In air a slight coating of oxide forms on zinc which protects it from further action. Pure water does not act upon pure zinc, nor do pure hydrochloric or sulphuric acids, but in these diluted with water vigorous action occurs, with evolution of hydrogen. At ordinary temperatures zinc is brittle and may be readily broken, but upon heating it becomes softer and can be beaten or rolled into sheets or plates. At $200^\circ\text{C}.$ it again becomes brittle and may be readily pulverized. Metallic zinc which is commercially called **spelter**, is obtained from various blends or combinations occurring in different countries and in different sections of the country. A great quantity is obtained in the United States from deposits in Missouri, Arkansas, Tennessee and as far west as the Sierra Nevada range of Mountains. It occurs in different localities in quite different forms of combination and ores, and is, therefore, obtained by different treatment according to its combinations, but in the final results the metal zinc is produced by distillation and condensing the vapor; much of the zinc used, however, is in the form of zinc carbonate or oxide and is prepared from its ores in these forms without converting it into metallic form.

In periodic arrangement zinc is in Group II, Series 5, and forms a family with cadmium and mercury. It was discovered by Paracelsus, a Swiss chemist, in 1520, and was early used in the manufacture of bronze. Metallic zinc is usually produced from its ores, by roasting the sulphide in a current of air and afterwards placing the oxide produced, with charcoal, in earthenware retorts, which are at first gradually heated to expel carbon monoxide. The temperature is then increased to the vaporizing point of zinc, when it distills over and is received in a chamber in impure form and afterwards treated in various ways until purified. Zinc is used for many purposes in the arts and industries, especially in generating electricity, and in the form of alloy with copper—brass—is one of the most commonly used metals known; it is greatly used as a coating for sheet iron, which, when so coated, is known as "galvanized iron." In the form of oxide, zinc is used as a white paint, and forms the basis of a great number of pigment combinations. In medicine a number of the salts of zinc are employed, which will be duly noticed under *Zincum*, in Part II.

Zinc Salts.

The following are the salts of Zinc generally known and used in chemistry and pharmacy. A number of them are official in various pharmacopœias and will be further noticed in Part II. of this work.

Zinc Acetate. $\text{Zn}(\text{C}_2\text{H}_3\text{O}_2)_2 + 2\text{H}_2\text{O}$. Official in most countries. It may be readily prepared by adding zinc carbonate to strong acetic acid until effervescence no longer occurs, then filtering the solution, condensing by evaporation and crystallizing. This is given as an astringent tonic in doses of 1 to

2 grains and as emetic in doses of 10 to 20 grains, but it is chiefly used in solution as a wash or injection.

Zinc Benzoate. By adding to a hot, concentrated solution of benzoic acid zinc oxide mixed with a little water until no more will dissolve, then evaporating and crystallizing.

Zinc Borate. $\text{ZnB}_2\text{O}_7 + 7\text{H}_2\text{O}$. This may be prepared by the interaction of zinc acetate in solution with a hot solution of boric acid; zinc borate precipitates. It is used as an antiseptic and astringent dusting powder, or in ointments.

Zinc Bromide. ZnBr_2 . Official in the U. S. and a few European pharmacopœias. It may be prepared by the decomposition of potassium bromide with zinc sulphate. The formula for the preparation is given in Part II.

Zinc Carbolate. By adding to carbolic acid liquified by heat and kept hot, zinc oxide until no more will dissolve, then allowing to crystallize.

Zinc Carbonate, Precipitated. The U. S. preparation is hydrated zinc carbonate. It is official as Zinc Carbonate in the Br. P. and as Carbonate (sous-) de zinc hydraté in the Fr. Ph.

The formula for its preparation and uses are given in Part II.

Zinc Chloride. ZnCl_2 . Official in all pharmacopœias. This is prepared by dissolving zinc in hydrochloric acid and by the addition to the solution of a little chlorine solution and zinc carbonate etc. The formula for its preparation is given in Part II. It is chiefly used as an application to morbid growths and in solution as an antiseptic and disinfectant.

Zinc Cyanide. $\text{Zn}(\text{Cn})_2$. Prepared by adding hydrocyanic acid to solution of zinc acetate and collecting the precipitate. This is used as a nervous sedative in doses of $\frac{1}{8}$ to $\frac{1}{2}$ grain. Official in the Fr. and Sp. Ph.

Zinc and Potassium Cyanide. By dissolving zinc cyanide in a solution of pure potassium cyanide, concentrating and crystallizing.

Zinc-Ethyl, etc. Zinc also combines with the organic bases forming liquid salts, which take fire spontaneously when exposed to the air. Zinc-ethyl, zinc-methyl and zinc-amyl are examples of these substances, but they have no use except as chemical curiosities.

Zinc Ferrocyanide. $\text{Zn}_4(\text{C}_6\text{N}_6)_4\text{Fe}_2$. By mixing solutions of zinc sulphate and potassium ferrocyanide, collecting and washing the precipitate. Official in Nedl. S.

Zinc Gallate. Zinc Subgallate. A grayish-green powder, insoluble in ordinary solvents. It may be prepared by precipitating a hot solution of gallic acid with a solution of zinc sulphate, collecting the precipitate, drying and reducing to a powder. It is used in night-sweats. Dose 1 to 4 grains, and in eczema in the form of dusting powder or ointment, also in injections in suspension with mucilage or oil.

Zinc Hypophosphite. By dissolving zinc carbonate in hypophosphorous acid until neutral, then concentrating and crystallizing. Dose $\frac{1}{2}$ to $1\frac{1}{2}$ grains.

Zinc Iodide. ZnI_2 . Official only in the U. S. It may be prepared by digesting granulated zinc in excess with iodine diffused in water in a manner similar as directed for making iron iodide, which see. This is given as an alterative. Average dose, 0.065 gm.=65 milligrammes (1 grain).

Zinc Lactate. $\text{Zn}(\text{C}_3\text{H}_5\text{O}_3 \cdot 3\text{H}_2\text{O})$. By dissolving zinc carbonate to saturation in diluted lactic acid, concentrating and crystallizing. Official in Belg., Fr., Russ. and Swed. Ph.

Zinc Nitrate. By adding to diluted nitric acid granulated zinc until no more will dissolve, then concentrating and crystallizing.

Zinc Oxalate. By dissolving zinc carbonate to saturation in a solution of oxalic acid, concentrating and crystallizing.

Zinc Oxide. ZnO . This is official in the U. S., Br. and most of the European pharmacopœias. The method of preparing it, its uses and doses are fully given in Part II.

Zinc Perhydrol. This is a brand name for zinc peroxide, containing 50 percent. of the zinc peroxide.

Zinc Permanganate. By the action of permanganic acid on metallic zinc, and crystallizing. This is used as an injection in gonorrhœa, in very dilute solution.

Zinc Peroxide. ZnO_2 . This is produced by heating zinc oxide in fine powder, in a current of oxygen for some time, and then mixing with it an equal weight of zinc oxide. It is used as an ingredient of face powders, and in zinc peroxide soap etc., supposed to have a bleaching action on the skin; also as a dusting powder for wounds, ulcers etc.

Zinc Phenate. This is another name, now more frequently used, for zinc carbolate.

Zinc Phenolsulphonate. U. S. Zinc Sulphocarbolate. Br. Also official in several European pharmacopœias. The formula for preparing it and its uses are given in Part II.

Zinc Phosphate. By the action of phosphoric acid on metallic zinc, and crystallizing. Official in Fr. Ph.

Zinc Phosphide. ZnP_2 . This is official in the Fr. P. and was formerly official in the U. S. P. It may be prepared by fusing zinc in a properly constructed apparatus and passing over the melted mass vapors of phosphorus in a current of dry hydrogen until the zinc is converted into a phosphide. It is made only by manufacturing chemists who are properly equipped for its production.

It is employed in medicine as a nerve stimulant and aphrodisiac, given particularly for nervous debility induced by sexual exhaustion. It is safer and less irritating than phosphorus. The dose is $\frac{1}{20}$ to $\frac{1}{8}$ grain in pills or powders.

Zinc Salicylate. $\text{Zn}(\text{C}_7\text{H}_5\text{O}_3)_2 \cdot 3\text{H}_2\text{O}$. By heating salicylic acid with distilled water and gradually adding zinc oxide, suspended in water, until no more will dissolve, then filtering, concentrating and crystallizing. Official in Ger. S. and Russ Ph.

Zinc Sozoiodolate. This is a zinc combination with sozoiodol. Useful as a substitute for iodoform. It is a white, astringent powder, having the astringent properties of zinc with the antiseptic properties of sozoiodol. It is soluble in 20 parts of water and its solution is useful in catarrh, leucorrhœa etc. It is applied in the form of a dusting powder, 10%, with talcum powder, for sores, wounds and ulcers. See Part II.

Zinc Stearate. U. S. This preparation was made official in the 8th revision of the U. S. P. It is a very light, white powder, used for dusting irritated surfaces and in form of ointment for skin diseases, eczema etc. It is more fully described in Part II.

Zinc Sulphate. $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$. This is official in the U. S., Br. and most all pharmacopœias. It may readily be prepared by dissolving granulated zinc in sulphuric acid and chlorine solution. The process is given in full, together with its uses in Part II. It is quite commonly called "White Vitriol."

Zinc Sulphide. By passing a current of hydrogen sulphide into a solution of zinc sulphate to which sodium acetate has been added to neutralize the acid set free from the zinc salt. Zinc sulphide is precipitated.

Zinc Sulphite. By the action of sulphurous acid upon metallic zinc, and crystallizing.

Zinc Sulphocarbolate. This is another name for zinc phenol-sulphonate, now official.

Zinc Tannate. To a concentrated solution of tannic acid add zinc oxide, suspended in water, until no more will dissolve, then filter, concentrate and crystallize.

Zinc Tartrate. This may be prepared by mixing hot, concentrated solutions of zinc sulphate and neutral potassium tartrate, collecting the precipitate and drying.

Zinc Valerate. Br. and several European pharmacopœias, but now properly **Zinc Valerate**, according to recent nomenclature. The formula for preparing it and its uses are given in Part II.

ZIRCONIUM.

Sym. Zr; at. wt. ($\text{O}=16$) 90.6; sp. gr. 4.15; quadrivalent.

This is one of the elements of the carbon group closely related to titanium and thorium. It is found in nature chiefly in zircon, ZrSiO_4 , from which

it may be obtained by decomposing this silicious oxide in the electric furnace.

The metal is black, amorphous, very difficultly fusible; its oxide, ZrO_2 , gives a very bright light when strongly heated and is therefore advantageously used instead of lime in the Drummond light.

In periodic arrangement it is in Group IV, Series 6. It was discovered by Brezeliuss, the Swedish chemist, in 1824. It unites with the halogen elements and with oxygen, silicon, carbon and sulphur. Its chief industrial use is for producing intense light (its oxide) when heated in the oxy-hydrogen flame, or otherwise.

Zirconia. ZrO_2 . This is zirconium oxide, and is the compound used to produce a bright light when acted upon by the oxyhydrogen flames.

Zirconium Carbide. CZr . Moissan produced this by heating the mineral zircon with sugar charcoal in the electric furnace.

Zirconium Chloride. This may be produced by heating the carbide to a dull-red, with chlorine until it is converted into the chloride.

Zirconium Hydrate. $Zr(OH)_4$. This is precipitated from solutions of zirconium salts by ammonia. It is basic.

Zirconium Nitrate. By dissolving zirconium hydroxide, (hydrate), to saturation in nitric acid and crystallizing.

Zirconium Sulphate. This may be prepared by dissolving zirconium hydroxide to saturation in sulphuric acid, and crystallizing.

The foregoing Chemical Elements include all that are, at present, recognized by the International Committee of Atomic Weights. A few others are claimed to have been discovered by scientific investigators but, as yet, have not been sufficiently defined to secure their official recognition. Not more than one-half of the listed elements are generally known or have other use than as chemical curiosities. Ten of the elements make up ninety-nine percent., and all of the remainder not more than one percent. of the known constituents of the earth.

Chemical elements combine with each other to form most of the substances which form the crust of the earth, but the atmosphere is composed of a mixture of oxygen, nitrogen and small quantities of rare gases—not chemically combined but free elements. They seem to be the gaseous residue, left over after all mineral combinations caused by intense heat had been effected.

All chemical atoms carry a charge of electricity and are either electro-positive or electro-negative. Chemical combination is the union of chemical elements of opposite electrical states. If a chemical salt in solution is decomposed by electrolysis, the electro-positive element is liberated at the negative electrode (kathode) and the electro-negative element at the positive electrode (anode). The elements forming the compound are liberated from their combination and may be recovered at the electrodes in the same proportion as they were present in the compound. All elements combine in proportions corresponding to their electrical charge.

This is because elements of an opposite electrical state attract each other, and of a like electrical state repel each other; thus, when in solution, where they may move freely, the positive ions go to the negative, and the negative ions to the positive electrode.

Heat and light have also much to do with the combination of elements. These subjects cannot be discussed at length in the limits of this work but are fully explained in advanced chemical text books, to which our readers are referred.

PART II.

DRUGS, CHEMICALS and PREPARATIONS

Working Formulæ

In this part of this work all the crude drugs having assay processes, official in the U. S. P., are described; and the formulas are given for all regular chemical and pharmaceutical preparations recognized by the U. S. and Br. pharmacopœias, together with most of those official in other countries. Besides these the chemical and pharmaceutical preparations not official—but popular and in demand in any country—are described and formulas given for them whenever practicable.

The official titles of drugs, chemicals or preparations are generally followed by the abbreviated name of the country or authority in which they are official, but unofficial drugs or preparations are seldom so designated. So far as is practicable official drugs or preparations have the Latin titles of the U. S. or Br. pharmacopœias; or, if not official in those authorities, the Latin or other official primary title by which they are known in the countries from which they are derived. In the French, Spanish, Mexican, Italian and some other pharmacopœias the primary titles are in the language of the country; but in the majority of the authorities they are in the Latin.

In giving formulas for preparations other than those of English-speaking countries exact translation of the text is not attempted, but only to give the names, quantities and directions as briefly and concisely as possible—the object being to present a comprehensive formulary for such preparations as are in demand in all countries at the present time.

It seems unnecessary to state that in preparing the formulas given in this volume, the best quality of everything should be used and the

directions carefully followed. It is often of great importance that the ingredients of a formula be added or mixed in proper order, or as directed. The directions should, therefore, be carefully observed.

The general index of this volume comprises all substances mentioned in any part of the work and the page numbers refer to the pages on which the subjects will be found, regardless of whether they are in Part I., II., or III., references being made, in many cases, to more than one part of the work.

ABSTRACTA — ABSTRACTS.

Abstracts were introduced in the 1880 U. S. P. for the purpose of standardizing certain active medicines which were considerably used in the form of "powdered extracts," but for which there was no established standard of strength. As they only represented double the strength of the drug, their value for such purposes was questionable and they never became popular. They were omitted from the 1890 U. S. P. and are now seldom called for. They are still official in the Russian Pharm., and are made in the same manner as was directed in the U. S.

Extracta duplicia (Duplex Extracts) of the Swiss Pharm. are made on the same principle as Abstracts in a similar manner, except that the process is more elaborate and that rice powder is used instead of milk sugar. (See Extracts).

The U. S. P. process was in substance as follows:

Two hundred parts of the powdered drug was directed to be exhausted by percolation with a suitable menstruum; 170 parts which first passed were reserved and the remainder of the percolate concentrated by evaporation to 30 parts. The reserved and concentrated portions were then mixed with 50 parts of milk sugar and the mixture slowly evaporated to dryness. The mass was then powdered and weighed and enough powdered milk sugar added to make one-half the weight of the drug originally taken.

The following Abstracts were official:

Abstractum Aconiti. Abstract of Aconite.
Abstractum Belladonnæ. Abstract of Belladonna.
Abstractum Conii. Abstract of Conium.
Abstractum Digitalis. Abstract of Digitalis.
Abstractum Hyoscyami. Abstract of Hyoscyamus.
Abstractum Ignatiæ. Abstract of Ignatia.
Abstractum Jalapæ. Abstract of Jalap.
Abstractum Nucis Vomica. Abstract of Nux Vomica.
Abstractum Podophylli. Abstract of Podophyllum.
Abstractum Senegæ. Abstract of Senega.
Abstractum Valerianæ. Abstract of Valerian.

ACETAL. Diethyl-acetal. Diethyl-aldehyde. Ethylidine-diethyl Ether.

A colorless, volatile liquid of pleasant odor and agreeable after-taste, occurring in crude spirit and old wines, produced by the imperfect oxidation of

alcohol. It may be prepared by passing hydrochloric acid gas into a mixture of aldehyde with an equal volume of absolute alcohol. A compound of aldehyde and ethyl chloride is formed, which, by heating with sodium ethylate, produces Acetal. Sp. gr. 0.821, boils at 21°C. (69.8°F.). It is miscible with alcohol and ether in all proportions; soluble in 28 parts of water or 25 parts of chloroform. Inflammable.

Dose 4 to 5 Cc. (1 to 1.25 fl.drachms) as a hypnotic.

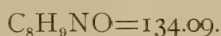
ACETAMID or ACETAMIDE.

Acetamid or Acetamide. The amide of acetic acid. C_2H_5NO or $CH_3CO(NH_2)$. It may be prepared by distilling ammonium acetate or by heating together acetic acid and ammonia gas, under pressure, with agitation.

It is a white crystalline compound, melting at 78°C. (142.4°F.), and boiling at 221°C. (429.8°F.). As a base it combines with acids forming some important salts, as phenyl-acetamide, (acetanilide), etc.

ACETANILIDUM. U. S. Acetanilide.

Phenylacetamide. Antifebrin.



"The monacetyl derivative [$C_6H_5NH(CH_3 \cdot CO)$] of aniline." <U. S.
"Acetanilide, $CH_3 \cdot CO \cdot NH \cdot C_6H_5$, may be obtained by the interaction of glacial acetic acid and aniline." <Br.

Acetanilide was first introduced into the U. S. P. in the 1890 revision and in the Br. addendum to the 1885 P. It is also official in all the late pharmacopœias under similar title.

"Antifebrin" was first introduced in 1887 as a copyrighted antipyretic and became quite popular before the chemical title, acetanilide, was given it. As the process of making it was not patented it was soon made official. This title is now seldom used.

Preparation. Acetanilide may be prepared by mixing equivalent quantities of pure aniline with glacial acetic acid and boiling them together for a considerable time.

93 parts of pure aniline and 60 parts of glacial acetic acid are mixed in a suitable retort having a reversed condenser, and heated to the boiling point for four hours during which time, water (H_2O) is eliminated. The heat is then raised on a sand-bath to 260°C. at which temperature the vapor of acetanilide passes over and is received into cold water in which it crystallizes,—about 100 parts resulting from the quantities taken. The crystals precipitated in water may be dried and sublimed, when a lighter, whiter and finer crystallized product is obtained. Kelbe's process, which is used by some manufacturers, is similar to the above, but aniline and acetamide are employed.

Characteristics The crystals of acetanilide are odorless and colorless, unctuous laminæ, like powdered mica. They have a slight pungent taste. Melting point when dry, 113°C. (236°F.).

Soluble in 179 parts of water and in 2.5 parts of alcohol at 25°C. (77°F.); 18 parts of boiling water and 0.4 part of boiling alcohol; also soluble in 12 parts of ether and 5 parts of chloroform at 25°C. (77°F.).

Tartaric acid increases its solubility in aqueous menstrua.

When triturated with carbolic acid, chloral hydrate, resorcin or thymol, a liquid or soft mass is formed which is soluble in dilute alcohol or spirits.

Medicinal Uses "Antifebrin" was extensively used as a semi-proprietary anti-pyretic before "acetanilide" became known to the trade. It was then popularly known as the "poor man's quinine." It is now extensively used in medicine to reduce temperature, relieve headache, especially la-grippe in its early stages, and as an analgesic in many conditions. It is also valuable as an antiseptic in combination with boric acid as a dusting powder or in solution as a wash for wounds, sores, ulcers or internal cavities. It is the prominent ingredient of many proprietary headache powders and hypnotics, anodynes and analgesics which are extensively advertised.

Average dose.—0.250 Gm.=250 milligrammes (4 grains). U. S.

The usual dose is from 3 to 5 grains, (0.25 to 0.33 Gm.). The maximum dose should not exceed 10 grains (0.65 Gm.) as larger doses cause extreme depression and prostration.

It is best taken as a powder on the tongue, and rinsed down with a drink of water, or in capsules or wafers.

Pure Food and Drugs Law, U. S. Acetanilide is listed among the substances which must be designated on the label of preparations intended for interstate commerce.

ACETONUM. U. S. Acetone.

Pyroacetic Spirit. Dimethyl-ketone.

"A liquid containing not less than 99 percent., by weight, of absolute acetone, (dimethyl-keytone, $\text{CH}_3\text{COOH}_3=57.61$). It should be kept in well-closed vessels in a cool place, remote from lights or fire." <U. S.

Preparation. It is produced by the dry distillation of cellulose, sugar, gums etc., and is always present in crude wood alcohol from which it may be separated for use; but it is prepared chiefly for commerce by the dry distillation of calcium acetate, the distillate being purified by agitating it with a saturated solution of sodium bisulphide.

In chemistry it is extensively used in the production of chloroform, of which it yields nearly double its weight when distilled with water and lime hypo-chlorite, or chlorinated lime; also in making iodoform and sulphonal. It is much used as a solvent of fats, camphors and resins, and is employed in many manufacturing industries.

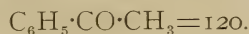
Acetone is also a solvent for soluble gun-cotton (pyroxylin) and collodion may be prepared with gun-cotton 5 parts, acetone 95 parts, which may be advantageously used for some purposes.

Acetone Chloroform, trade name Chloretone. Acetoform, a name for Acetone Chloroform. Acetone Collodion, trade name Filmogen.

Acetone Salicylic Ether, trade name Salacetol. Acetone Alcohol, a brand name for methyl alcohol.

ACETOPHENONUM. Acetophenone. Hypnone. Hypnon.

Methylacetone. Phenyl-ethyl-ketone.



This preparation is quite generally known as Hypnone, and was first produced by Dujardin-Beaumetz, in 1885, as a hypnotic; since which time it has been considerably prescribed.

Preparation It is produced by the dry distillation of calcium acetate with calcium benzoate. The crude distillate which contains about 6 percent. of hypnone, is purified by repeated fractional distillation, frozen by surrounding the vessel containing it in ice, and the adhering liquid removed from the frozen mass by bibulous paper. It is again rectified by distillation.

Dose from 3 to 8 minims, given best in syrup of acacia or other mucilaginous mixtures. It may also be given mixed with twice its volume of olive oil, in gelatin capsules.

Acetophenone-phenetidid. **Malarin.** This is produced by the interaction of acetophenone and para-amidophenetol. It is in light-yellow crystals, insoluble in water, but slightly soluble in alcohol. It is employed as an antineuralgic and antipyretic. Dose 5 to 10 grains.

ACETOPYRINE. Aceto-salicylate of Antipyrine.

A combination of acetic acid with salicylate of antipyrine. A white crystalline powder, having a faintly acetic odor. Slightly soluble in water or ether, but quite soluble in alcohol.

It is employed in medicine in the treatment of articular rheumatism, sciatica, ague, neuralgia, migraine etc. It does not cause gastric disturbances nor cardiac depression as do so many of the analgesics.

Dose 0.50 Gm. (8 grains), five or six times a day, preferably in cachets. In exceptional cases 1 Gm. doses (15 grains) may be given.

ACETOZONE. Benzozone. Peroxide of Benzoyl-acetyl.



A crystalline substance melting at 29° to 30°C. An energetic bactericide employed in aqueous solution. Soluble in 1000 parts of water, 20 parts of oil, slightly soluble in alcohol, moderately in ether or chloroform, but slowly decomposing in these elements and in contact with alkaline and organic matter. It was discovered by Profs. P. C. Frees and F. G. Novy of the University of Michigan. 30 grains in ½ gallon of water makes a saturated solution, the clear portion may be decanted and used as a germicide. This is only found in the market in fifty percent. mixture with some absorbent powder. A light cream-colored powder of peculiar odor and pungent taste. Externally and internally it is used as an antiseptic and disinfectant in typhoid fever etc.

Dose 3 to 5 grains (0.2 to 0.3 Gm.), usually in dilute aqueous solution. Externally 10 percent. triturations are employed.

ACETPHENETIDINUM. U. S. Acetphenetidin.

Commonly called Phenacetin.

"A phenol derivative [Acetparaphenetidin, $C_6H_4(OC_2H_5) \cdot NH \cdot CH_3 \cdot CO$ 1:4], the product of the acetylation of para-amidophenetol." <U. S. See also Phenacetinum, Br.

Newly official in the U. S. P., but for some time recognized in many of the European pharmacopœias under the name Phenacetin, Fenacetin, or some similar title. It was discovered in 1887 by Kast and Hinsberg, who first gave it the name Phenedine, which was later changed to Phenacetine. It is an acetic derivative of phenetidine (ethylic ether of para-amidophenol). Para-, meta- and ortho-phenacetin have been prepared, but the former only is used in making acetphenetidin. The U. S. P. describes it as "White, glistening scales, or fine crystalline powder, odorless and tasteless. It is soluble in 925 parts of water, 12 parts of alcohol, 63 parts of ether, and 20 parts of chloroform, at 25°C. (77°F.); in 70 parts of boiling water and in 2 parts of boiling alcohol."

It is much employed under the name of Phenacetin, as an antipyretic and sedative.

Average dose.—0.500 Gm.=500 milligrammes ($7\frac{1}{2}$ grains).

Acet-para-phenetidin. The chemical name for Phenacetin.

ACETATES.

Under this title may be included chemical and pharmaceutical preparations in which acetic acid is a combining factor or in which it is used as a solvent for medicinal principles. Acetates may be conveniently classed as follows:

Chemicals, in which acetic acid unites in definite proportions with bases, as alkalies and metals, alkaloids etc., forming chemical salts known as **acetates**.

Solutions or Liquors, in which acetic acid combines with a base when the solution is not sufficiently concentrated to cause crystallization; as solution or liquor ammonium acetate, solution acetate of iron etc., or simple solutions of acetate salts in water or other liquid, as solution of morphine acetate etc.

Extracts or Fluid Extracts, in which acetic acid is used wholly or in part as a menstruum for exhausting the drug, as in the official extracts of colchicum, nux vomica etc.; and fluid extracts conium, ergot, nux vomica etc., as well as many unofficial fluid extracts in which strong acetic acid is used as a menstruum. Recent experiments in making extracts and fluid extracts with diluted acetic acid as a menstruum have demonstrated that it is of great advantage as a solvent

for medicinal principles, and that a great number of fluid extracts may be advantageously made with an acetic menstruum. Squibb, in a recent catalogue, lists 4 Acetextracts and about 75 Fluid-acet-extracts, prepared with dilute acetic acid as a menstruum.

Tinctures, in which an acetic solution is diluted with an alcoholic liquid, as tincture of acetate of iron.

Vinegars, in which the medicinal value of the drug is obtained by the use of acetic or diluted acetic acid as a menstruum.

In this class are included the proper Aceta, or medicated vinegars of the pharmacopœias, the formulas for which follow:

Acetate. A salt formed by the chemical union of acetic acid with a base is called an "Acetate."

The Acetate Ion. $C_2H_3O_2$. As the acetate ion forms but few nearly insoluble compounds it is not readily determined by precipitates. A solution supposed to contain an acetate may be mixed with an equal volume of diluted sulphuric acid and a little alcohol added. The mixture is then warmed for some time nearly to boiling, then cooled, and if the acetate ion is present it may be recognized by the characteristic, agreeable odor of ethyl acetate (acetic ether) which has developed.

If cyanogen, chlorate or chromate ions are present, however, this test does not apply. If cyanides are present, make the solution alkaline with ammonia water and evaporate to one-half, this removes the cyanogen ions and the solution may be tested as above, provided it does not contain chlorates or chromates. If these are present, add sulphuric acid until strongly acid, cool, then add a few fragments of zinc and set aside for half an hour. This will reduce the chlorate and chromate ions and the acetate ion may be detected by the process first described.

ACETUM. Vinegar.

Vinegar, which is acetic acid of rather uncertain strength and composition was formerly official in the U. S. P., but was dismissed from the 1880 revision; it was also official in the Br. P., but was dismissed in the 1898 revision. It is retained in most of the other pharmacopœias. Vinegar is a common table requisite in nearly all countries and is considerably used as a domestic remedy, both internally and externally. It is produced from a great variety of substances containing sugar or constituents that may be converted into sugar and then into alcohol, and results from the acetous fermentation which changes weak alcoholic liquids into acetic acid.

Fruit juices of all kinds—grape, apple, pear, peach, the berries and all fruits containing sugar—sap from the maple, juice from beets or sugarcane, the malt liquors, the juice of the cactus and many other plants which produce sugar or glucose, starch solutions from grain, rice, potatoes etc., may be used for making vinegar; the acetous fermentation being readily induced in all liquids which are susceptible of, or which have passed through vinous fermentation.

Vinegar varies considerably in flavor, color and taste, as well as in the percentage of acetic acid which it contains, according to the material from which it is made. In most countries the percentage of

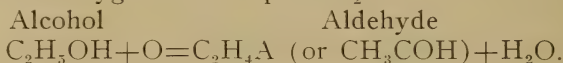
acid strength is regulated by law; from $4\frac{1}{2}$ to 6 percent. being the usual standard.

In the United States the vinegar of commerce is quite generally prepared from the juice of apples, commonly known as **cider vinegar**; in Great Britain it is chiefly prepared from malt and is known as **malt vinegar**; in France, Germany, Italy and other European countries, where grapes are abundant, it is prepared from wine and is known as **wine vinegar**, both white and red vinegar being common; in other countries it is usually prepared from the most common fruits or plants yielding saccharine juices or starchy substances which may be converted first into alcohol and then into vinegar.

Acetification. The process of making vinegar is termed "acetification." The first step in the process is vinous fermentation or the conversion of sugar into alcohol. So long as vinous fermentation is in progress acetic fermentation does not begin, and the latter can only be developed in liquors of weak alcoholic strength.

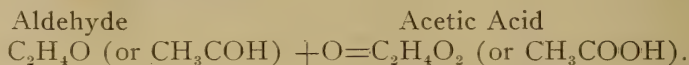
Acetous fermentation is not, like vinous fermentation, accompanied by evolution of carbon dioxide.

The second step in the process is the conversion, by atmospheric oxidation, of alcohol into aldehyde, (which see). The molecule of alcohol, which is composed of two atoms of carbon, six of hydrogen and one of oxygen, (C_2H_5OH), is broken up, parting with two atoms of its hydrogen, and converted into aldehyde (C_2H_4O), the hydrogen uniting with the oxygen taken up as H_2O .



The aldehyde resulting from the dehydration of ethyl alcohol is commonly called "aldehyde," but is properly acetic or ethyl aldehyde, there being many other "aldehydes."

The third or final step in the process of acetification is the oxidation of aldehyde, by which it unites with another atom of oxygen, and is converted into acetic acid.



Acetous fermentation is caused by the development of a microscopic vegetable, *Micoderma Aceti*, having the power of absorbing oxygen from the atmosphere, which, by uniting with the molecule of aldehyde, converts it into acetic acid.

In a domestic way vinegar is made from cider or other fruit juices by allowing them to ferment and then exposing them in half-filled casks or vessels, with the bungs or stoppers removed, so that the air may have free access to the surface of the liquid. The bungs should be covered loosely with cheese-cloth to prevent the access of insects and dirt. It requires about two years to make good vinegar in this manner, and the casks should be watched as the acetification approaches com-

pletion in order to prevent the putrefactive changes that may occur after the acetification is fully completed. This may be prevented by filling the casks and bunging them tightly, towards the conclusion of the process.

Mother of Vinegar, which occurs during the slow process of acetous fermentation of saccharine liquids, is a species of vegetation which is said to facilitate the production of vinegar, but is only used in domestic manufacture. A little of the "mother" is added to each barrel to hasten the process.

Vinegar Generator. At vinegar factories or plants the process of acetification is greatly hastened by distributing the liquid to be acetified over a large surface so that the growth of the *Microderma Aceti* may be increased. This is done by means of an apparatus called a **Vinegar Generator** so constructed that the liquid drips or runs over or through beech or oak shavings, grape stems and skins, corn cobs or husks, or strips of cloth or paper, thus presenting an extensive surface for the growth of the vinegar plant, and for the passage of air from which it derives its power to convert alcohol and aldehyde into acetic acid. This apparatus consists usually of a large tank or vessel fitted with a false bottom, in which numerous holes are bored, to allow the liquid to run through and the air to pass upward. Upon this false bottom the shavings or other distributing substances are placed and saturated first with strong, hot vinegar. The liquid to be acetified is then allowed to trickle over them, and is drawn off from time to time at the bottom and again and again poured over the shavings or other material in the tank or cask until it is finally converted into vinegar of the required acid percentage. A row of holes should be bored in the circumference of the cask, just below the false bottom, to admit air and thus facilitate the oxidation. With a properly constructed vinegar generator good vinegar can be produced in from 36 to 48 hours, or at the outside in three day's time. The rapid production of vinegar by such an apparatus is due to the great surface upon which the micoderms have an opportunity to develop and thus produce the acetic change.

Vinegar made from wine contains tartaric acid which softens cucumber and other pickles, in which it is used. It is therefore objectionable for that purpose. Vinegar made from cider contains no tartaric acid and is preferable for pickling. There is, also, no objection to malt vinegar for pickling.

Theoretically one percent. of absolute alcohol should produce one and one-tenth percent. of real acetic acid, but it is customary in practice to count one for one. Therefore an alcoholic liquor of 5% alcohol should produce a vinegar of 5% acid strength. It is customary in making vinegar to develop whatever the alcohol in the liquid will produce and reduce it, if necessary, to the legal standard required.

Proof Vinegar. Vinegar that contains the standard percentage of real acetic acid required by law is called "proof vinegar." In this country the standard is $4\frac{1}{2}$ percent.; in Great Britain 4.6 to 5 percent.

The U. S. Custom House standard for vinegar is that strength which requires 35 grains of potassium bicarbonate to neutralize 480 grains of vinegar. Vinegar is frequently sold as 30 grain test, 32 grain test, or 35 grain test, meaning that it requires so many grains of potassium bicarbonate to neutralize 480 grains.

In Great Britain a fluid ounce of standard vinegar weighing 445.4 grains, requires about 402 grain measures of volumetric solution of soda for its neutralization.

The Pure Food Laws. Much care is now required, by those who manufacture and sell vinegar, to have it conform to the requirements of the pure food laws. It must in the U. S. be up to the government standard of strength, and must not be adulterated, fabricated or misnamed in any particular. If it is sold as "cider vinegar" it must be made from cider. Many of the states, also, have laws relative to the strength and purity of vinegar.

ACETA MEDICATA — MEDICATED VINEGARS.

Vinaigres Médicinaux, Acétoles, Fr. Oxedolados, Acetolados, Sp.

Medicated vinegars which were formerly prominent among official preparations, have been gradually dismissed from the U. S. P. until now only two remain, and from the Br. P. until only three are retained. In most other pharmacopœias a greater number appear. Some vinegars, also, that were formerly official or have been in demand, are still called for occasionally and their formulas are retained in this work. If vinegars of other drugs than are herein noted are wanted, they may be made extemporaneously as follows:

General Formula for Medicated Vinegars.

Fluidextract of any drug required, 1 part or 1 fl.drachm

Diluted Acetic Acid, U. S. 6%, 9 parts or 9 fl.drachms

Mix them. This makes a 10% vinegar of the drug, which is the customary standard.

ACETUM ANTISEPTICUM. Antiseptic Vinegar.

Vinegar of the Four Thieves. Prophylactic Vinegar.

Marseilles Vinegar.

This medicinal vinegar is popular in France, Spain and southern Europe as a lotion, and inhalant for headache. It is also in great repute as a prophylactic or preventive against contagious diseases and a corrector of bad odors of the body. It is official in the French, Mexican and Spanish pharmacopœias. The formulas differ but slightly, but the French formula as translated will suffice for all.

Wormwood, (common), Roman wormwood, peppermint, rosemary, rue, sage, lavender flowers, of each, 15 grammes (120 grains); calamus root, Ceylon cinnamon, cloves, nutmeg, garlic, of each, 2 grammes (16 grains); camphor, 4 grammes (32 grains); glacial acetic acid, 15 grammes (120 grains); white vinegar, 100 grammes (17½ fl.ounces).

Bruise the substances, except the camphor, and macerate with the vinegar, in a closely covered vessel for 10 days; then strain with expression. Dissolve the camphor in the glacial acetic acid, add to the strained liquor and, after standing, filter.

ACETUM AROMATICUM. Aromatic Vinegar.

The U. S. and Br. pharmacopœias have no formulas for Aromatic Vinegar, but the following one may be used in this country whenever Aromatic Vinegar is prescribed or called for. Most of the European pharmacopœias have formulas for Aromatic Vinegar, some of them directing oils as flavoring ingredients, and some of them the dried or fresh plants. It is, probably, more convenient to use the oils, but there is a certain flavor obtained from the plants which does not so well appear when oils are used. It is considerably used as a toilet requisite and cooling lotion, a little poured upon a moist sponge and applied to the skin being very refreshing; it is also used as an inhalent and is taken internally as a mild aromatic.

Aromatic Vinegar. (Nat. Form.). Oil of lavender, oil of rosemary, oil of juniper, oil of peppermint, oil of cinnamon, each, 0.5 Cc. (8 minims); oil of lemon, oil of cloves, each, 1 Cc. (16 minims); alcohol, acetic acid, (U. S. P. 36%), each, 175 Cc. (6 fl.ounces); water, a sufficient quantity to make 1000 Cc. (32 fl.ounces).

The oils are to be dissolved in the alcohol, the acetic acid added and lastly, enough water to make 1000 Cc. (32 fl.ounces). The turbid mixture is to be warmed for several hours at a temperature not exceeding 70°C. (158°F.), care being taken that it shall not lose by evaporation. It is then to be set aside for a few days, agitated occasionally and filtered.

ACETUM CAMPHORATUM. Camphorated Vinegar.

A solution of camphor in vinegar or acetic acid is official in several European pharmacopœias. It is used externally as an antispasmodic and resolvent lotion, also as an inhalent for headache etc. The French formula, as translated, will answer for all.

Camphor, glacial acetic acid, of each, 25 grammes (120 grains); white vinegar, 950 grammes (9½ fl.ounces).

Pulverize the camphor in a porcelain mortar and rub it with the glacial acetic acid; then add the vinegar gradually, continuing the trituration; pour into a bottle; let stand and filter.

ACETUM CAMPHORÆ COMPOSITUM.**Vinegar of Camphor Compound.**

This preparation, commonly known in France and Spain as **English Vinegar**, is extensively used by painting or rubbing on the skin, or by pouring upon cloth or blotting paper and placing it over the affected part for neuralgia, headache etc. It is also much used as an inhalent, added to different kinds of smelling salts, or in a vinaigrette, in which it is usually colored red.

Vinaigre Anglais. Acetum Britannicum. Fr. Glacial acetic acid, 100 grammes (10 ounces); camphor, 10 grammes (1 ounce); oil of cinnamon, oil of cloves, of each, 0.20 gramme (10 minims); oil of lavender, 0.10 gramme (5 minims).

Pulverize the camphor, put in a glass stoppered bottle with the glacial acetic acid and the oils; shake frequently until dissolved.

See *Acidum Aceticum Aromaticum Camphoratum*.

ACETUM CANTHARIDIS. Br. Vinegar of Cantharides.

Cantharides, bruised, 2 ounces (100 grammes); glacial acetic acid and distilled water mixed in equal volumes, a sufficient quantity to make 20 fl.ounces (1000 Cc.).

Macerate the cantharides in 18 fl.ounces (900 Cc.) of the mixture of glacial acetic acid and water for 24 hours; then transfer to a glass percolator and when the liquid ceases to pass add sufficient of the menstruum, in successive portions, through the percolator to produce 20 fl.ounces (1000 Cc.) of the vinegar of cantharides. This represents ten percent. of the drug.

This is an efficient vesicant, used for blistering. It may be applied with a camel-hair pencil over the surface required to be blistered. It is sometimes called *Blistering Liquid*. See also *Collodium Vesicans*.

ACETUM COLCHICI. Vinegar of Colchicum.

Although vinegars of colchicum are not official in the U. S. or Br. pharmacopœias, they are found in several of the European pharmacopœias and are occasionally called for. They may be made extemporaneously for general purposes by mixing fluid extract of colchicum (either seed or bulb) 1 fl.drachm, with 9 fl.drachms of diluted acetic acid, making a ten percent. preparation. They are prescribed for rheumatism and gout in doses of from 5 to 30 minims (0.60 to 2 Cc.).

Acetum Colchici Bulbi. Vinaigre de Colchique. Acétole de Colchique. Fr. Fresh bulbs of colchicum, sliced, 200 grammes (2 ounces); glacial acetic acid, 20 grammes (90 grains); white vinegar, 980 grammes (9¾ fl.ounces).

Macerate 8 days in a wide-mouthed bottle, with frequent agitation; strain with expression and filter the liquid.

Acetum Colchici Seminis. Germ. Colchicum seed, in moderately fine powder, 1 part (1 ounce); alcohol, 1 part (1 ounce); pure vinegar, 9 parts (9 ounces). Macerate seven days and filter.

ACETUM CUM ACIDO CARBOLICO.

Vinegar with Carbolic Acid.

This is official in three European pharmacopœias. It may be used as a cooling application for irritated skin. The formula is:

Carbolic acid, crystals, 10 grammes (10 grains); acetic acid, 50%, 200 grammes (or 200 grains); distilled water, 790 grammes (or 1¾ fl.ounces). Mix and filter.

ACETUM IPECACUANHÆ. Br. Vinegar of Ipecacuanha.

Liquid extract of ipecacuanha, (Br.), 1 fl.ounce (or 50 Cc.); alcohol, (90%), 2 fl.ounces (or 100 Cc.); diluted acetic acid, 17 fl.ounces (or 850 Cc.).

Mix, filter, and if necessary, add sufficient diluted acetic acid to produce 1 pint Imp. (20 fl.ounces), or 100 Cc. of the vinegar of ipecacuanha. This represents five percent. of the drug.

Dose 10 to 30 minims (0.60 to 2 Cc.), as an expectorant or emetic.

Liquid extract of ipecacuanha, which is directed in this formula, is a solution of the active principles of ipecacuanha corresponding to a fluid extract. For extemporaneous purposes 1 fl.drachm of the fluid extract of ipecacuanha may be mixed with 19 fl.drachms of diluted acetic acid to make vinegar of ipecacuanha. Dose 10 to 30 minims.

ACETUM LOBELIÆ. Vinegar of Lobelia.

Lobelia herb, in coarse powder, 100 grammes (or 729 grains); alcohol, 125 Cc. (or 2 fl.ounces); diluted acetic acid, sufficient to make 1000 Cc. (or 16 fl.ounces).

Mix the alcohol with an equal quantity of diluted acetic acid and moisten the drug with the mixture; pack in a glass percolator and cover with diluted acetic acid and allow to stand twenty-four hours. Then percolate, adding diluted acetic acid through the percolator until the required measure has been passed. This represents ten percent. of the drug.

This may be conveniently made extemporaneously by mixing 1 fl.drachm of fluid extract of lobelia with 9 fl.drachms of diluted acetic acid. This was formerly official but was dismissed from the 1890 U. S. P. It is sometimes called for by Eclectic or Thompsonian physicians.

A number of vinegars made in the same proportion and in the same manner are official in European pharmacopœias. They are

Acetum Belladonnæ. Vinegar of Belladonna.

Acetum Digitalis. Vinegar of Digitalis.

Acetum Lavendulæ. Vinegar of Lavender.

Acetum Rosmarini. Vinegar of Rosemary.

Acetum Rutæ. Vinegar of Rue.

Acetum Sabadillæ. Vinegar of Cevadilla.

ACETUM OPII. U. S. Vinegar of Opium.

This preparation, which is frequently called for, has been for a long time an official in the U. S. P. and is still retained.

Powdered Opium,	100 Gm. or 729 grains
Nutmeg, in No. 30 powder,	30 Gm. or 213 grains
Sugar,	200 Gm. or 1458 grains
Diluted Acetic Acid,	
sufficient to make	1000 Gm. or 16 fl.ounces

Macerate the opium and nutmeg in 500 Cc. (or 8 fl.ounces) of the diluted acetic acid during seven days, frequently stirring; then strain through muslin of close texture and express the liquid. Mix the residue with 200 Cc. (or 3 fl.ounces) of diluted acetic acid to a uniform magma and strain and express again. Mix and filter the expressed liquids, dissolve the sugar in the filtrate and pass enough diluted acetic acid through the filter to make the product measure 1000 Cc. (or 16 fl.ounces). This represents ten percent. of powdered opium.

The addition of 1½ fl.ounces of alcohol to each pint of the diluted acetic acid would be of advantage in this preparation.

Dose 10 to 15 minims (0.60 to 1 Cc.). Used for the same purposes as the tincture of opium, but preferred by some, as the principles which cause headache and nausea in tincture of opium are not dissolved by the acetic menstruum.

Average dose.—0.5 Cc. (8 minims).

A similar preparation is known in some of the European pharmacopœias as *Acetum Thebaicum*; *Liquor Sedativus*.

ACETUM OPII COMPOSITUS. Aromatic Vinegar of Opium.

This was at one time much used under several proprietary names, but it is generally known as the **British Black Drop**. The following formula is generally used in the U. S. and Gr. Bt.: Powdered opium, 100 grammes (or 729 grains); nutmeg, in powder, 30 grammes (or 218 grains); saffron, in powder, 10 grammes (or 73 grains); sugar, 200 grammes (or 1458 grains); alcohol, 125 Cc. (or 2 fl.ounces); diluted acetic acid, sufficient to make 1000 Cc. (or 16 fl.ounces).

Make in the same manner as *Acetum Opii*. Uses and dose the same.

ACETUM ROSARUM. Vinegar of Roses.

This vinegar is official in several pharmacopœias. When made from red roses of fine flavor it makes an elegant addition to lotions, injections etc. It is somewhat astringent, but is used chiefly for its color and flavor. The French formula, as translated, is given.

Vinaigre de Rose Rouge. Fr. Red rose leaves, 10 grammes (or 2 ounces); acetic acid, 2 grammes (or 192 grains); white vinegar, 98 grammes (or 19¾ ounces). Macerate 8 days and filter.

ACETUM RUBI IDÆI. Raspberry Vinegar.

In the U. S. this vinegar is prepared by allowing the juice of red raspberries to pass into acetous fermentation, but in some European countries it is made by adding fresh raspberries, 100 parts, to pure vinegar, 300 parts; a little syrup being also sometimes added. It is a finely flavored vinegar of a deep reddish color.

ACETUM SANGUINARIÆ. Vinegar of Bloodroot.

This was formerly official in the U. S. P., but was dismissed in the 1890 revision. As it is sometimes used, the formula is given.

Sanguinaria, in powder, 729 grains (or 100 grammes); alcohol, 1½ fl.ounces (or 75 Cc.); diluted acetic acid, sufficient to make 16 fl.ounces (or 1000 Cc.). Mix the alcohol with twice the quantity of diluted acetic acid, and macerate the powder in the mixture for 24 hours; then transfer to a glass percolator and add diluted acetic acid until the required measure of vinegar of bloodroot has passed. This represents ten percent. of the drug.

This may be made extemporaneously by mixing 1 fl.drachm of fluid extract of sanguinaria with 9 fl.drachms of diluted acetic acid.

Dose 5 to 30 minims (0.60 to 2 Cc.) as a stimulant to the mucous membrane, used chiefly in small doses as an expectorant in cough mixtures.

ACETUM SCILLÆ. U. S. Vinegar of Squill.

This preparation is official in the U. S. and in all European countries. It is used chiefly in preparing syrup of squill and as an ingredient in cough medicine or as a diuretic. The medicinal strength of vinegar of squill does not vary greatly in various countries, being generally about squill does not vary greatly in various countries, being generally about ten percent., but the menstruum and manner of preparation differs considerably in different pharmacopœias. In making vinegar of squill from the dried bulb much menstruum is absorbed during maceration and the product, at best, is rather uncertain, but the U. S. and Br. formulas provide for that in a measure by directing a definite quantity of the finished product to be obtained from a stated quantity of the drug.

The U. S. P. directs

Squill, in No. 20 powder, ... 100 Gm. or 2 ounces

Distilled Acetic Acid,

sufficient to make

1000 Cc. or 20 fl.ounces

Macerate the squill with 900 Cc. (or 18 fl.ounces) of the diluted acetic acid during seven days, frequently stirring; then strain through muslin and wash the mass on the strainer with enough diluted acetic acid to make the strained liquid measure 1000 Cc. (or 20 fl.ounces). Heat the liquid to boiling, filter while hot, and when cold add sufficient

diluted acetic acid to make the product measure 1000 Cc. (or 20 fl.ounces). This represents ten percent. of the drug.

Average dose.—1 Cc.=15 minims.

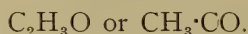
The Br. P. directs:

Squill, bruised,	125 Gm. or 20 fl.ounces
Diluted Acetic Acid,	
sufficient to make	1000 Cc. or 20 fl.ounces

Exhaust the squill by maceration as directed for tinctures. The resulting vinegar of squill should measure 1000 Cc. (or 20 fl.ounces).

Dose 10 to 30 minims.

ACETYL.



The hypothetical monatomic radical, acetyl, is known only in its combinations. It is the radical of acetic acid which is produced by its union with hydroxyl, OH, forming $\text{C}_2\text{H}_4\text{O}_2$ (or $\text{CH}_3\cdot\text{COOH}$), which is acetic acid. It has not been isolated as a substance, but is known to exist as the basis of acetic acid and its derivatives.

This radical forms a great number of compounds with acids, many of which have been introduced in medicine under trade names. Some of them are mentioned under this heading.

Acetyl Chloride.

Acetyl-ethoxy-phenyl-urethane. Chemical name for Thermoline.

Acetyl-naphthalin.

Acetyl-para-amidosalol. Chemical name for Salophen.

Acetyl-paraoxy-phenyl-urethane. Chemical name for Neurodin.

Acetyl-phenyl-hydrazin. Hydracetin. Pyrocin.

Acetyl-salicylate of Antipyrine. Trade name Acetopyrine.

Acetyl-salicylic Acid. Chemical name for Aspirin.

Acetyl-salicylate of Methyl.

Acetyl-salicyl-phenetidin. Chemical name for Thermoi.

Acetyl-tannin. Chemical name for Tannigen.

Acetyl-trimethyl Colchicine Acid.

ACETYLENE.



This is the first member of what is known chemically as the third, the ethene, or acetylene series of hydrocarbons, $\text{C}_n\text{H}_{2n-2}$. (See Hydrocarbons). It is a gas considerably used for illuminating purposes. It may be produced directly from elements by causing the electric arc to pass between the poles of dense carbon in an atmosphere of hydrogen.

Prof. Moissan of Paris, in investigating the waste products of the electric furnace, discovered a very simple way of generating acetylene gas by the action of water upon calcium carbide, forming a waste product of some electrical processes. Lamps have been invented in which calcium carbide is placed and water allowed to drop upon it. Acetylene gas is thereby generated and burned through small gas burners. In this way a portable gas light is secured, which is of great

convenience for bicycles, automobiles, coaches etc., and is now being adopted on railroads. Generators and reservoirs are also constructed by which this gas may be made, stored and used for lighting buildings in the same manner as ordinary illuminating gas. On account of its portability and the fine light produced it offers many advantages. Carbon disulphide absorbs a large percentage of this gas and has, therefore, been proposed as a storage vehicle for it. Experiments regarding its use have not yet been concluded, but it promises many possibilities.

ACIDA — ACIDS.

A great variety of chemical substances are classed and included under the generic name, **Acids**.

In a popular sense acids are substances having a sour taste and the property of changing vegetable blues to reds; but in chemistry acids are compounds containing hydrogen ions, which, when the acid substance is dissolved in water, show their presence by changing blue litmus paper to red, and by reacting with metals, liberating hydrogen.

Hydrogen, being a constant element of all acids, is called the **Acid Former**, and an acid may be considered a salt whose metal is hydrogen, which is displaced or recombined, partly or wholly, when salts are formed with other basic substances, metals, radicals, alkalies or alkaloids. The recent chemical authorities and the Br. P. recognize this and name the acids accordingly, as hydrogen nitrate, HNO_3 , nitric acid; hydrogen sulphate, H_2SO_4 , sulphuric acid etc.

A characteristic of all acids is the liberation of hydrogen by reacting with a metal. Metallic magnesium acts more readily with an acid than any other metal; any acid in solution will react with this metal if a little, in powder, is added to the solution. Very many other substances besides acids contain hydrogen, but differ from them in not having this important property. An acid gives hydrogen as one of its ions. Acids may be gaseous, liquid or solid, and may be organic or inorganic. Organic acids are derived from vegetable and animal substances. Inorganic acids from mineral or inorganic substances.

Oxyacid is a term frequently employed in chemistry to designate acids containing oxygen. In the early days of chemistry, oxygen was considered essential to acids, as its name, **oxy-gen**, (**acid producer**) implies. Most acids do contain oxygen united to a basic element which gives the name to the acid, as sulphuric acid or hydrogen sulphate, (H_2SO_4), containing hydrogen, sulphur and oxygen. Oxygen is not, however, a constituent of the gaseous acids which combine with water to form hydro-acids, as Hydriodic acid, HI ; Hydrobromic acid, HBr ; Hydrochloric acid, HCl ; Hydrocyanic acid, HCN ; Hydrofluoric acid, HF ; but is only present in the water in which these gases are dissolved.

Anhydrides. There are, however, several so-called acids which do not contain hydrogen, but are properly **anhydrides**. An anhydride is an oxide of a not-metal, which, on the addition of water, forms an acid. Anhydrides may also be defined as acids from which the constituents of water have been removed. They have the power to combine with basic oxides to form salts the same as hydrogen compounds. Carbon dioxide (gas), CO_2 ; arsenic trioxide, AsO_3 ; chromium trioxide, CrO_3 , are examples of anhydrides commonly called acids, which combine in the presence of water to form acids. Silica, SiO_2 is also an anhydride which combines with strong alkaline solutions, forming silicates, and in crystalline form, by fusion with soda ash, forms glass.

Absolute Acid. The real acid that a substance contains, exclusive of diluent, is **absolute acid**—as, for example, hydrochloric acid contains 31.9 percent., by weight, of absolute or real hydrochloric acid, HCl , (meaning hydrochloric acid gas) dissolved in 68.1 percent. of water.

Acid Salt. This term is applied to salts in which only a part of the displaceable hydrogen of the acid has been replaced by a base—as acid potassium sulphite; acid quinine hydrochloride; acid sodium sulphite; acid potassium tartrate etc.

Acidification. The chemical process by which substances combine to form acids, or the state in which they exist as acids is called acidification.

Acidimetry. The process of ascertaining the percentage of acids by the use of standard alkaline test solutions is called acidimetry. It is the opposite of alkalimetry in which the percentage of alkali is ascertained by the use of standard acid test solutions.

This operation is accomplished by means of an **Acidimeter**, or Acidometer, which consists of a graduated burette or tube in which the liquids are mixed in such proportions as to produce a neutral solution, the neutralization being determined by an indicator solution which is added. The percentage of acid is thus calculated from the quantity of alkaline solution required to neutralize a given quantity of the acid. Another form of acidimeter shows the percentage of acid in a solution by generating carbonic dioxide gas with sodium bicarbonate. This form of acidimeter is used chiefly for testing grape juice, or other fruit juices, wines and vinegar.

Acids in Pharmacy. The acids themselves are not extensively used in medicine, but salts formed by their union with basic substances constitute a very important class of pharmaceutical and chemical products. In pharmacy the Latin name of the base usually follows, as *Acidum Nitricum*; but when rendered into English, the basic name precedes the generic term, as Nitric Acid.

In chemistry the name and termination of the basic title generally indicates the composition of the acid as hydrogen **nitrite**, HNO_2 , (nitrous acid); hydrogen **nitrate**, HNO_3 , (nitric acid).

ACIDUM ACETICUM. U. S., Br. Acetic Acid.

"A liquid composed of not less than 36 percent., by weight, of absolute Acetic Acid [$\text{CH}_3\cdot\text{COOH}=59.58$], and about 64 percent. of water, and obtained by the oxidation of ethyl alcohol or by the destructive distillation of wood." <U. S.

It is a clear, colorless acid liquid, miscible with water or alcohol in all proportions. When heated it is volatilized without leaving a residue. Sp. gr. about 1.045 at 25°C . (77°F .).

This acid is supplied by manufacturing chemists, of U. S. official strength, 36 percent., or may readily be prepared by mixing

Glacial Acetic Acid,	36 parts or 36 gm. or $4\frac{1}{2}$ oz. av.
Distilled Water,	64 parts or 64 gm. or 8 oz. av.

When thus prepared it is free from empyreumatic odor, which is usually present in the acid furnished by manufacturing chemists and is, therefore, preferable for medicinal uses.

"Acetic acid is a product of the destructive distillation of wood, and the oxidation of ethylic alcohol. 100 parts by weight should contain 33 parts of hydrogen acetate, $\text{CH}_3\cdot\text{COOH}$, and 67 parts of water." <Br.

Sp. gr. 1.044.

This acid is supplied by manufacturing chemists of Br. official strength, 33 percent., or may readily be prepared by mixing

Glacial Acetic Acid,	33 parts or 33 gm. or $4\frac{1}{8}$ oz. av.
Distilled Water,	67 parts or 67 gm. or $8\frac{3}{8}$ oz. av.

Source. Acetic acid is the natural acid of vinegar in which it is found in the proportion of from 4 to 6 percent., it is also obtained from wood by destructive distillation, the crude product being pyroligneous vinegar. It may be concentrated by distillation from either natural or pyroligneous vinegar, or may be absorbed by alkali bases with which it forms salts (acetates) and then obtained by distilling these salts with sulphuric acid.

Uses. Acetic acid is seldom employed as medicine, but is extensively used in making chemical salts—**Acetates**, and for extracting the medicinal principles of certain drugs. It is also used in the arts for many purposes, especially as a mordant in calico printing and to counteract the effect of alkalies used in laundry work. Commercial acetic acid is known as No. 8. Acetic acid of 60 and 80 percent. strength may also be had from manufacturing chemists.

Acetates are salts formed by the union of acetic acid with a basic substance. Most of the metals and alkaloids combine with acetic acid to form acetates. As a class the acetates are readily decomposed and form the basis from which many other chemical salts are prepared by transposition.

When wood is distilled the pyroligneous acid which comes over, together with other products, is saturated with milk of lime, combining

with it to form lime acetate, which is the commercial basis of acetic acid and of most of the acetates.

Acidum Aceticum Aromaticum. Acetic acid 72 parts, oil of bergamot, oil of thyme, each, 3 parts; oil of cinnamon 1 part, oil of cloves 9 parts, oil of lemon, oil of lavender, each, 6 parts.

Acidum Aceticum Aromaticum Camphoratum. The same as *Acetum Camphoræ Compositum*, which see.

Acidum Acetum Camphoratum. Camphor 1 part, powdered with a few drops of alcohol, dissolved in acetic acid (43.5%) 50 parts. This is stronger of acetic acid than *Acetum Camphoratum*, which see.

Acetum Commune and **Acetum Crudum** are Latin titles for vinegar of four percent. of the Swedish pharmacopœia.

Acetum Destillatum. **Distilled Vinegar.** This was formerly official in the U. S. P.; eight pints of vinegar being taken and seven pints distilled over. French distilled vinegar (*Vinaigre Distillé*, *Oxéolat Simple*) is prepared by taking any convenient quantity of wine vinegar and distilling over three-fourths of its volume.

Acetum Purum (Swiss)—**Reiner Essig**, is a title given to pure vinegar containing five percent. real acetic acid.

Acetum Pyrolignosum. **Pyroligneous Vinegar.** **Wood Vinegar.** This preparation is official under the above title in several of the European pharmacopœias; but, as it is properly the source of commercial acetic acid, its manufacture will be considered under that heading. It is official in the German and Swiss pharmacopœias under the above title.

Acetum Radicale. **Vinegar Radical.** This is acetic acid distilled from copper acetate. Very strong, sp. gr. 1.075 to 1.083.

ACIDUM ACETICUM DILUTUM. U. S., Br.

Diluted Acetic Acid.

"It should contain not less than 6 percent., by weight, of absolute Acetic Acid [$\text{CH}_3\cdot\text{COOH}=59.58$], and about 94 percent. of water." <U. S. Sp. gr. about 1.009 at 25°C. (77°F.).

Acetic Acid, 36%, 100 gm. or 1 ounce av.

Distilled Water, 500 gm. or 5 ounces av.

This may also be readily prepared by mixing

Glacial Acetic Acid, 6 gm. or 1 ounce av.

Distilled Water, 94 gm. or 15⅓ ounces av.

Average dose.—2 Cc. (30 minims).

"100 parts by weight should contain 4.27 parts of hydrogen acetate, $\text{CH}_3\cdot\text{COOH}$." <Br.

Acetic acid (33%), 150.2 gm. or 1137 grains; distilled water, a sufficient quantity to form 1000 Cc. or one Imperial pint of diluted acetic acid. Sp. gr. 1.006.

This may be more conveniently prepared by adding to glacial acetic acid 375 grains, distilled water enough to make 20 ounces av.

Dose.— $\frac{1}{2}$ to 2 fl.drachms.

ACIDUM ACETICUM GLACIALE. U. S., Br.

Glacial Acetic Acid. Crystallizable Acetic Acid.

"A liquid containing not less than 99 percent., by weight, of absolute Acetic Acid [$\text{CH}_3\cdot\text{COOH}=59.58$], and not more than 1 percent. of water." <U. S.

Sp. gr. not above 1.049 at 25°C . (77°F .). It becomes a crystalline solid at a temperature somewhat below 15°C . (59°F .), and boils at 117° - 118°C . evolving inflammable vapors.

"100 parts by weight should contain 99 parts of hydrogen acetate, CH_3COOH ." <Br. Sp. gr. 1.058 and this is increased by the addition of 10 percent. of water, (distinction from a diluted acid of 46 percent., which has the same specific gravity). Br.

Glacial acetic acid was first prepared in 1793 by Lowitz, a Russian chemist, it is recognized in most pharmacopœias but the official titles differ considerably.

Medicinal Uses. Glacial acetic acid is considerably used as an application for corns, callouses, warts etc. It has also been recommended in the treatment of cancer and malignant growths.

ACIDUM ARSENICUM. Arsenic Acid.

Arsenic acid, H_3AsO_4 , is a true acid uniting with bases to form salts called arseniates or arsenates. When strongly heated it loses the elements of water and becomes arsenic anhydride, As_2O_6 .

It is used as an oxidizing agent for many purposes, especially in the manufacture of aniline dyes, and arsenates are extensively used in calico printing. It is more fully described under Arsenicum, which see.

ACIDUM ARSENIOSUM. Br.

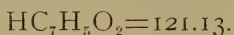
Arsenic. White Arsenic. Arsenious Acid.

"Arsenious Anhydride, or arsenious oxide, As_2O_3 , is obtained by roasting certain arsenical ores." <Br.

Dose $\frac{1}{60}$ to $\frac{1}{15}$ grain.

In the Eighth revision of the U. S. P. this is described under the title **Arseni Trioxidum**. (Which see for fuller description).

Acidum Arsenicum. Arsenic Acid. H_3AsO_4 . This acid differs from arsenous acid, which is official in the U. S. Its salts with bases are arsenates, while the salts of arsenous acid are arsenites. See Arsenicum.

ACIDUM BENZOICUM. U. S., Br. Benzoic Acid.**Flores Benzoës. Flowers of Benzoïn.**

"An organic acid, $[\text{C}_6\text{H}_5\cdot\text{COOH}]$, obtained from benzoin by sublimation, or prepared artificially." < U. S.

"Benzoic Acid, $\text{C}_6\text{H}_5\cdot\text{COOH}$, is obtained from benzoin by sublimation. It may also be obtained from toluene, from hippuric acid, and from other organic compounds." < Br.

Official in all pharmacopœias.

Preparation. A process was formerly official for preparing benzoic acid by sublimation from benzoin in coarse powder. The benzoin was spread evenly over the bottom of an iron basin and covered with filtering paper which was pasted over the edge of the basin, a cap of thick paper was then set over the basin and heat was applied until the benzoic acid ceased to be vaporized. The benzoic acid vapor passed through the filtering paper and was gathered from time to time as it was deposited on the inside of the conical receiver.

At the present time most of the benzoic acid found in the market is prepared from toluol, by sublimation, in a somewhat similar manner. There is considerable difference however, in the odor and flavor of the real and artificial benzoic acid, and, although the price of the real is much more than the synthetic, it is preferable to use it in making preparations in common use, (chiefly paregoric).

Some other processes which produce a greater percentage of benzoic acid are used in its commercial manufacture, from 12 to 18 percent. being obtained from some grades of benzoin.

Properties. Benzoic acid varies very considerably in solubility, according to its source and manner of preparation. The U. S. P. states that it is soluble, when pure, in 281 parts of water at 25°C . (77°F .), in 15 parts of boiling water and in 1.8 part of alcohol. The Br. P. states that it is soluble in 400 parts of cold water and in 17 parts of boiling water, and the Ph. Ger. states that it is soluble in 370 parts of cold water. The difference stated for its solubility in alcohol, ether and other media vary fully as much in the different pharmacopœias, showing that there is considerable variation in the benzoic acid found on the market.

It is a constituent of all the true balsams and is found in many animal and vegetable products. Characteristic tests readily determine whether the benzoic acid is natural or synthetic, but the appearance and odor will readily indicate to an experienced pharmacist one from the other.

Medicinal Uses. Benzoic acid is a stimulant to the mucous membrane and is considerably used as an expectorant, being a characteristic ingredient of paregoric. It is also much employed in the treat-

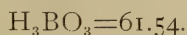
ment of bladder troubles and urinary diseases, and as a remedy for excess of uric acid, gouty deposits etc. It is a powerful antiseptic and is used with advantage in gastric and internal ulcerations and wherever septic germs are to be overcome.

Average dose.—0.500 Gm.=500 milligrammes ($7\frac{1}{2}$ grains). U. S. Larger doses are commonly given, from 10 to 30 grains (0.65 to 2 gm.) and even 60 grains (4 gm.) may sometimes be administered. It is best given in mucilaginous liquids or milk.

Benzoates. Benzoic acid combines with the alkaline bases, with alcohol radicals and with most of the metals, forming salts of much value as antiseptics and antiferments. Sodium benzoate is extensively used as a preservative for canned fruits, fruit juices and syrups.

ACIDUM BORICUM. U. S., Br. Boric Acid.

Boracic Acid. Hydrogen Borate.



"It should contain not less than 99.8 percent. of pure Boric Acid $[\text{B}(\text{OH})_3]$." <U. S.

Average dose.—0.500 Gm.=500 milligrammes ($7\frac{1}{2}$ grains).

"A weak acid obtained by the interaction of sulphuric acid and borax and by the purification of native boric acid." <Br.

Source. It is obtained in a native state chiefly from volcanic districts; but the American market is supplied by decomposing California borax in solution, with strong hydrochloric acid. The use of boric acid in medicine has very greatly increased during the past few years. It was discovered by F. Hoefer in 1777.

Properties. Boric acid is found in the market in "colorless, pearly, lamellar crystals or irregular masses of crystals, unctious to the touch; taste feebly acid and bitter, leaving a sweetish after-flavor in the mouth." <Br. In the U. S. it is chiefly used in pharmacy in the form of fine powder; as it is much employed in antiseptic dressings and solutions. It is soluble in 26 to 30 parts of cold water and in 3 parts of boiling water from which it crystallizes when cool. It is also soluble in from 5 to 10 parts of glycerin and in 15 parts of alcohol. Its solution in alcohol or glycerin imparts a green color to flame. When heated to 100°C . (212°F .), boric acid liquifies and loses about 43.6 percent. of its weight of water of crystallization, solidifying on cooling to a brittle transparent mass. This is known as fused boric acid.

Medicinal Uses. Boric acid has come into extensive use, externally, as an antiseptic, either in the form of a dusting powder or in solution. It is also used in diphtheria and ulcers, in the form of an impalpable powder which may be blown through a quill upon the diseased surfaces. It is also used in solution for injections, and in weak solution for inflammation of the eye, or as an insufflant, for catarrhal inflamma-

tion. Ointment of boric acid may be made by incorporating boric acid with petrolatum or lanoline, 1 part of the acid to 9 of the vehicle.

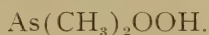
Internally boric acid is administered for gastric and internal irritation and for some forms of gastric fermentation. The usual dose is 10 grains (0.65 Gm.), three or four times a day. Large doses are poisonous. (See Borax and Boron).

Borates. Boric acid is a very weak compound and only slowly decomposes carbonates. The great borax beds of California have been formed by the slow decomposition of sodium carbonate in combination with boric acid. So weak is boric acid that its solution colors turmeric paper brown, like an alkali. It may be recognized by the green color it gives to flame, when in alcoholic solution.

The metaborate ion, BO_2 , forms nearly insoluble compounds with barium, calcium, silver, lead and some other ions. It forms with them white precipitates which are easily soluble in acids.

Acidum Boroglycerinatum. Boric acid 9 parts, is dissolved by heat in 14 parts of glycerin and the heat continued until the weight is reduced to 15 parts. It is like the U. S. Glyceritum Boroglycerini, which see.

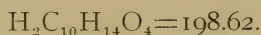
ACIDUM CACODYLICUM. Cacodylic Acid.



This is dimethyl-arsenic acid, a deliquescent crystalline compound, produced by the interaction between arsenic acid and methyl, in which two hydroxyl radicals have been replaced by two methyl radicals.

Recently cacodylic acid and its salts have been considerably used as substitutes for older preparations of arsenic in the treatment of neurasthenia, psoriasis and other skin diseases of nervous origin. It forms salts with the bases and alkaloids that have been proven effective in place of Fowler's Solution and other arsenic preparations that have formerly been used.

ACIDUM CAMPHORICUM. U. S. Camphoric Acid.



"A dibasic organic acid [$\text{C}_8\text{H}_{14}(\text{COOH})_2$], obtained by the oxidation of camphor." < U. S.

This rather uncertain acid was discovered in 1785 by Kosegarten. It is official in the U. S., Germ. and Nedl. S. pharmacopœias.

Preparation. It may be prepared by adding one part of camphor in powder to 10 parts of nitric acid in a retort, and heating or distilling by heat of a sand-bath as long as vapor rises. The contents of the retort is then poured into an evaporating dish and allowed to crystallize. The crystals are washed on a filter with cold water, then dissolved in hot water and the solution evaporated until a pellicle forms, and set

aside to crystallize. The crystals are then drained on blotting paper.

Properties. Colorless, odorless crystals or scales having a slightly bitter taste. Freely soluble in hot water and dissolves in 12.5 parts water at 25°C. (77°F.). Freely soluble in alcohol, less in ether and chloroform and in fatty oils, melts at 187°C. (368.6°F.).

Medicinal Uses. Camphoric acid has a specific action upon the mucous membrane and is used in the treatment of bronchitis, phthisis and pulmonary diseases. It is also employed in the treatment of gonorrhœa and syphilis, both internally and locally in solution.

Average dose.—1 Gm. (15 grains).

ACIDUM CARBOLICUM. Br. Phenol.

Carbolic Acid. Crystallized Carbolic Acid.

[U. S. title changed to Phenol in Eighth revision].

"Phenol, commonly termed Carbolic Acid, is obtained from coal-tar by fractional distillation." < Br.

It was discovered in 1834 by Runge in the tar of coal and is official in all pharmacopœias.

Preparation. In the distillation of coal-tar the portion which is collected between 165° and 190°C. (327° to 374°F.), consists largely of phenol or carbolic acid. This is termed **dead oil** and has to be redistilled and rectified before it is entitled to the name of **Crude Carbolic Acid**, (which see). By subsequent redistillations, treatment and purifications, this is freed from its impurities and associated hydrocarbons, and carbolic acid is finally isolated.

Properties. Carbolic acid is crystalline at ordinary temperatures but liquifies at from 35° to 41°C. (95° to 106°F.). Its specific gravity is about 1.065. It boils at about 188°C. (370°F.). It is inflammable, burning with a reddish flame. At normal temperature it is liquified by the addition of 10 parts (Br.) of water in 100 parts of the acid, but becomes turbid by the addition of a greater quantity up to 30 or 40 parts of water, when it becomes clear, but it only entirely dissolved in about 1200 parts of water. It is freely soluble in alcohol, chloroform, benzol, ether and glycerin, but is almost insoluble in benzin. It is weakly acid, but combines with alcohol radicals and with alkalis and other acids under certain conditions; with camphor, menthol and other stearoptens it forms liquids. It is usually found in the market in a solid crystalline mass, in bottles, but can now be obtained in loose crystals, making it more convenient to dispense if the crystallized acid is wanted. The solid crystalline mass is commonly called carbolic acid or "fused carbolic acid," and the term "loose crystals" or "detached crystals" is applied to the loose variety.

Medicinal Uses. Carbolic acid is extensively used as a disinfectant, although its value for that purpose is questionable. As an antiseptic

in diluted solutions it is much employed in surgery, also in the form of carbolated gauze, and for ulcers, sores and skin diseases, in the form of an ointment, two to five percent. it is used as a dressing for sores, burns etc. It is also used in suppositories, lotions, injections etc., but should be in very dilute solution.

Dose. Internally carbolic acid is administered in solution usually combined with mucilage, or in dilute trituration with milk sugar or in the form of troches. It is also used, much diluted, as an antiseptic for catarrhal discharges, as a douch, and for toothache etc. The dose internally is from 1 to 3 grains.

Antidote. The frequency of poisoning by carbolic acid demands a more effective antidote than has yet been proposed. Alcohol given freely and absorbents, as magnesia, flour, chalk, powdered elm bark, linseed meal etc. may be used advantageously.

Carbolates or Phenates. Carbolic acid or phenol is so weakly acid that it does not combine readily with bases to form salts, and its compounds with the alkaline bases are so feeble that they are decomposed in the presence of water. Sulphuric acid, however, is mixed with carbolic acid and stable salts known as **sulphocarbolates**, also as **phenol-sulphonates**, are prepared with a number of bases.

ACIDUM CARBOLICUM CRUDUM. Crude Carbolic Acid.

It was formerly official in the U. S. P. in which it was described as "A liquid consisting of various constituents of coal-tar, chiefly cresol and phenol, obtained by fractional distillation." This acid is of rather uncertain composition but is much employed as a disinfectant and for external application, especially in veterinary practice.

It is a brownish-red liquid of strong creosote odor, soluble in not less than 15 parts of water. It should only be used externally and largely diluted with water.

ACIDUM CARBOLICUM LIQUEFACTUM. Br. Liquefied Phenol.

[Phenol Liquefactum. U. S. Liquefied Phenol].

"Phenol to which distilled water has been added in the proportion of ten parts by weight of water to one hundred parts by weight of the phenol." <Br.

Carbolic Acid,

100 parts or 10 ounces av.

Distilled Water,

10 parts or 1 ounce av.

Mix them.

Sp. gr. at N. T. 1.064 to 1.069. It forms a clear solution on the addition of 18 to 27 percent. of water. It is convenient for all purposes for which crystallized carbolic acid is employed except in making ointments or mixing with oils.

Dose 1 to 3 minims.

"ACIDUM CARBONICUM." "Carbonic Acid."**Carbon Dioxide. Carbonic Anhydride.**

The so-called carbonic acid, (carbonic anhydride), is a gas at ordinary atmospheric pressure; but is now extensively used, condensed by pressure to a liquid, and contained in strong iron or steel cylinders for aërating soda and mineral waters, wines and beverages, also in the arts in many important operations.

This gas was known and described in the sixteenth century by Paracelsus and Van Helmont, and plays a very important part in chemical transformations.

Source. It is produced by the union of carbon and oxygen, as in the ordinary process of combustion, and is disengaged in the process of vinous fermentation and other natural operations. It is present to a small degree in the atmosphere and is the important food of vegetation. It is abundant in the carbonate earths, chalk, limestone and marble, and in organic matter. It may be obtained by adding sulphuric or hydrochloric acid to marble, whiting or other carbonates and collecting the gas. A great source of commercial supply of this gas is the breweries, from which it is collected, purified and condensed. Science maintains that this gas was at one time much more abundant in the atmosphere than at the present time; and that the coal measures are made up of decomposed vegetation grown during that period when carbon dioxide was extensively absorbed from the atmosphere. It is readily absorbed or combined and disassociated from many of its combinations with other substances.

Properties. Carbon dioxide does not support combustion, nor does it burn. At 0°C . (32°F .), and under a pressure of 36 atmospheres it is converted into a colorless, mobile liquid, known as **Liquid Carbonic Acid**. In a liquid state it is employed to produce intense cold by liberating the pressure suddenly in a receiver in which the air has been partially exhausted. It has been used in ice machines for producing cold. When absorbed in the presence of moisture, it forms **True Carbonic Acid**, H_2CO_3 , which is the acid that combines with bases, forming the important class of salts known as **Carbonates**.

Medicinal Uses. The carbonated waters are used considerably in medicine as refrigerating drinks to quench fever, reduce temperature and allay thirst. Plain soda water in various forms of siphon bottles is well known. The use of carbonic acid gas in charging soda fountains is familiar to most druggists.

ACIDUM CHROMICUM. Br. Chromic Anhydride.**Chromium Trioxidum. U. S. Chromium Trioxide.**

"Chromic Anhydride, CrO_3 , commonly termed chromic acid, is produced by the interaction of sulphuric acid and potassium bichromate." <Br.

Chromic acid was made known by Vaquelin in 1797.

The Br. 1885 pharmacopœia gave a formula for preparing chromic acid, in substance, as follows:

Potassium bichromate 3 grammes (or 30 ounces av.), sulphuric acid 5.7 Cc. (or 57 fl.ounces), distilled water a sufficient quantity to dissolve the potassium bichromate in a mixture of 50 fl.ounces (or 5 grammes) of the water and 42 fl.ounces (or 4.2 Cc.) of the acid. Set aside for 12 hours and decant the liquor from the crystals of acid potassium sulphate that have separated. Heat the liquor to about 185°F. (85°C.) and add the remainder of the acid and water sufficient to just redissolve the crystals of chromic acid that may have formed. Allow to cool, collect and drain the crystals and dry them on porous tiles, (a brick will do) in an air bath. From the mother liquor more crystals may be obtained on evaporation.

Properties. It crystallizes in long, prismatic needles, bright crimson-red in color. It is very soluble in water and alcohol and deliquescent when exposed to moisture. When heated to 192°C. (377°F.) it melts, and at 250°C. (482°F.) it parts with a portion of its oxygen and is converted to **green chromic oxide**, or **sesquioxide**, Cr_2O_3 .

Chromates. Chromic acid combines with the halogens, and with the alkalies and many other metals forming **chromates**. Owing to its property of liberating oxygen rapidly when decomposed, it forms very explosive compounds with nitrogenous substances.

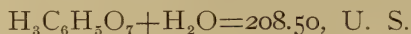
Medicinal Uses. It is best known in medicine as a caustic used for removing warts and other morbid growths. The solution employed in hospitals as a caustic is made with equal parts of the acid and water. It is also used in solution 1:1000 to 1:2000 as an antiseptic. It is seldom employed internally.

The chromic ion has a violet color and properties very like the ferric ion. It forms nearly insoluble compounds with hydroxyl and phosphate ions. With hydroxyl ion it forms a precipitate of chromic hydroxide, $\text{Cr}(\text{OH})_3$.

ACIDUM CHRYSOPHANICUM. Chrysophanic Acid. Chrysarobin.

This is an organic acid obtained from rhubarb, senna and some other drugs. It is used as a purgative in doses of 1 to 3 centigrams; also made into an ointment 1 part to 15 parts of petrolatum or lanolin, and applied to effect catharsis. It is supposed to be identical with cathartic acid.

ACIDUM CITRICUM. U. S., Br. Citric Acid.



This acid was first isolated by Scheele in 1784. It is official in all pharmacopœias.

"A tribasic organic acid $[C_3H_4(OH)(COOH)_3 + H_2O]$, usually prepared from the juice of limes or lemons. It should contain not less than 99.5 percent. of pure Citric Acid." <U. S.

"Citric Acid or Hydrogen Citrate $C_3H_4 \cdot OH \cdot (COOH)_3 \cdot H_2O$, may be obtained from the juice of the fruit of various species of *Citrus*." <Br.

Citric acid is a constituent of the citric fruits, lime, lemon, grape fruit, orange and bergamot, and of the cranberry, currant and many other berries; but it is most commonly obtained commercially, from lime and lemon juices.

Preparation. Lime or lemon juice is allowed to settle and carefully decanted; then brought to the boiling point, when whiting or ground marble is added, sufficient to saturate the acid of the juice, and the calcium citrate which is formed is allowed to subside. This precipitate is then well washed with water and dilute sulphuric acid added to decompose it. Calcium sulphate is precipitated and the supernatant solution being carefully drawn off from the sediment is then evaporated in leaden vessels until a pellicle forms, and set aside to crystallize. For purification the crystals of citric acid may be redissolved and recrystallized. The yield is from four to ten percent. of the fresh juice.

Properties. Citric acid dissolves at N. T. in 0.63 part of water, and in 0.4 part of boiling water. In alcohol it is soluble in 1.6 parts and in ether 18 parts. When exposed to the air for a considerable time it becomes covered with a white efflorescence, and if exposed to moist air deliquesces. When heated it melts at about $75^\circ C.$ ($167^\circ F.$) losing its water of crystallization and becomes anhydrous if the heat is continued.

Uses. Citric acid is but little used in medicine, but its salts are abundant and are extensively used and prescribed. It is considerably used in syrups made for soda-water, its solution for that purpose being known as **Fruit Acid**. It is also used for making artificial lemonade, combined with sugar, oil or extract of lemon and water.

Citrates. Citric acid is tri-basic, containing three replaceable atoms of hydrogen, and unites with bases forming three classes of citrates, as one, two or three atoms of hydrogen are replaced. When one or two of the hydrogen atoms are replaced, acid salts are produced; but when all three are replaced, neutral salts result. It may also combine with two bases, forming double salts, as bismuth and ammonium citrate, iron and ammonium citrate etc.

Average dose.—0.500 gm.=500 milligrammes ($7\frac{1}{2}$ grains).

ACIDUM FORMICUM. Formic Acid.



Preparation. This acid is official in several European pharmacopœias. It was formerly obtained from ants; but is now obtained com-

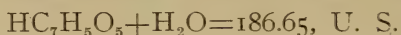
mercially by mixing equal weights of oxalic acid and glycerin with ten percent. of water in a capacious retort and heating gently to a little more than 100°C . (212°F .). By the interaction of the substances, carbonic acid gas, (carbon dioxide) and formic acid are produced; a little of the formic acid passes over with the vapor of water into the receiver; but the greater part remains in the receiver with the glycerin. This may be separated by adding an equal volume of water and slowly distilling, replacing the evaporated water in the retort until the formic acid has all passed over in the vapor. This may be then concentrated until it has a sp. gr. 1.060 to 1.063 which is the standard of the Ph Ger., corresponding to about 25% of the real formic acid.

The base of formic acid is the hypothetical univalent radical **formyl**, SHO. Formic acid is also known as **Methylic Acid** and **Hydric Formate**. The Ph. Ger. preparation is the diluted; a concentrated liquid acid of sp. gr. 1.20, and a crystallized acid also is made by manufacturing chemists. This acid constitutes the active principle of the stinging matter of ants, nettles etc.

Medical Uses. Diluted with an equal volume of water it is employed as a counter-irritant for rheumatism, paralysis and impaired circulation of the extremities. It is seldom given internally. Dose should not exceed 5 minims, (0.33 Cc.).

Formates. Formic acid unites with some bases producing **formates**, but they are seldom used, ammonium formate being the only one for which there is an occasional demand.

ACIDUM GALLICUM. U. S., Br. Gallic Acid.



"An organic acid $[\text{C}_6\text{H}_2(\text{OH})_3\cdot\text{COOH} + \text{H}_2\text{O}]$, usually prepared from tannic acid." <U. S.

"A trihydroxybenzoic acid, $\text{C}_6\text{H}_2(\text{OH})_3\text{COOH}, \text{H}_2\text{O}$. It may be prepared by the action of diluted sulphuric acid on tannic acid." <Br. 1898.

It was first discovered by Scheele in 1786.

Preparation. This acid which is also named **Dioxysalicylic Acid** may be readily prepared by boiling one part of coarsely powdered galls with four fluid parts of diluted sulphuric acid for half-an-hour then straining, while hot, through muslin; when cool, collect the crystals that are deposited, redissolve them in boiling water and recrystallize. It may be obtained colorless by filtering its purified solution through animal charcoal.

Properties. It is soluble in 83.7 parts of water and in 4.14 parts of alcohol at 25°C . (77°F .) in three parts of boiling alcohol; in twelve parts of glycerin, but sparingly soluble in ether, chloroform or benzene. It neither colors nor precipitates pure ferrous salts, but forms

a bluish-black precipitate with ferric salts. It differs from tannic acid in not coagulating albumen.

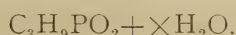
Medicinal Uses. It is used as an astringent, especially in kidney diseases and internal hemorrhages. It has been employed to advantage in Bright's disease and in the night sweats of phthisis. It does not cause constipation.

Average dose.—1 gm. (15 grains) U. S., 5 to 15 grains (0.32 to 1 Gm.). Br.

Gallates. Gallic acid combines with many of the metals and bases forming salts known as gallates, subgallates and digallates.

ACIDUM GLYCERINOPHOSPHATUM.

Glycerinophosphoric Acid.



This acid, although not official, is much used as the acid basis of a series of salts—Glycerinophosphates—that have recently come into extensive use in medicine.

Preparation. This acid may be prepared by heating together on a sand-bath, at a temperature of 100° to 110°C. for 6 hours.

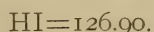
Concentrated Glycerin, 1 part or 1 pound

Metaphosphoric Acid, dry, 1 part or 1 pound

The warm mass formed is put into cold water and treated with baryta water until slightly alkaline, the solution is filtered and treated with carbon dioxide gas which precipitates any excess of barium. The solution is then filtered and concentrated by evaporation to a mass, which is then washed with alcohol. This removes any excess of glycerin and leaves the glycerinophosphoric acid in a solid form. This is then dissolved in just sufficient luke-warm water and the liquid acid of rather uncertain strength may be made to any required percentage of strength or sp. gr. by evaporation or by adding distilled water.

Uses. Manufacturing chemists furnish a concentrated acid which may be used for preparing the various glycerinophosphate salts by adding their carbonates to the acid until effervescence no longer occurs, then filtering the solution and evaporating it to a granular or powdered form. The manner of making these salts is fully explained under the heading Glycerinophosphates, which see.

ACIDUM HYDRIODICUM. Hydriodic Acid.



The gaseous acid which has the chemical formula HI was discovered by Gay-Lussac in 1814, and its solution in water (hydriodic acid) was official in the 1870 U. S. P.; but being an unstable preparation it was dismissed from the 1880 revision, the syrup of hydriodic

acid being substituted. Diluted hydriodic acid was made official in the U. S. P. Eighth revision.

Preparation. The gas, hydrogen iodide, is generated by putting iodine in successive small portions into water contained in a flask and passing hydrosulphuric acid gas through it until the color of the iodine in the solution is discharged and the turbid mixture becomes clear. The solution is then boiled to eliminate uncombined hydrosulphuric acid gas, and finally filtered. 480 grains of iodine are added in portions of 30 grains each to produce 6 fl.ounces of the acid.

It may also be prepared by the double decomposition of potassium iodide 209¾ grains, with tartaric acid 190¼ grains, each dissolved in 3 fl.drachms of water. The solutions are mixed and set aside in a cold place or surrounded by ice, when cream of tartar is thrown down, leaving the hydriodic acid in solution. The solution is then filtered and the measure made up to two fluid ounces with water. This contains some free tartaric acid in solution, but is sufficiently pure for most purposes. It is double the strength of other dilute acids now official and should be diluted with an equal quantity of distilled water to make **Diluted Hydriodic Acid**, ten percent. real acid, which is generally prescribed.

Concentrated Hydriodic (Hydro-Iodic) Acid is furnished by manufacturing chemists in sealed tubes, sp. gr. 1.50 and 1.70 for chemical purposes.

Iodic Acid. HIO_3 . This is an oxygen acid of iodine in crystalline form. It is somewhat used in medicine for the same purposes as iodine; but is chiefly employed in making chemical salts, **Iodates**, which are oxyacid salts produced by the combination of this acid with bases, as potassium iodate etc.

ACIDUM HYDRIODICUM DILUTUM. U. S.

Diluted Hydriodic Acid.

“A solution of hydriodic acid [$\text{HI}=126.9$], containing not less than 10 percent., by weight, of the absolute acid, and about 90 percent. of water. It should be kept in amber-colored glass-stoppered bottles, protected from the light.” <U. S.

The formula directs potassium iodide 135 Gm. (or 4 oz. av.+333 grains), potassium hypophosphite 10 Gm. (or 154 grains), tartaric acid 136.5 Gm. (or 4 oz. av.+356 grains), distilled water, diluted alcohol, each, a sufficient quantity. The potassium salts are to be dissolved in 250 Cc. (or 8½ fl.ounces) of distilled water with the aid of heat, and the tartaric acid in 400 Cc. (or 13½ fl.ounces) of diluted alcohol. The solution of tartaric acid is to be poured into a bottle of about 1000 Cc. (or 1 quart) capacity, the solution of potassium salts added and the mixture briskly shaken. The bottle is then to be placed in a bath of ice water for several hours, and, having inserted

a pledget of cotton tightly in the throat of a glass funnel, the contents of the bottle are to be transferred to the funnel. When all the liquid has passed through, wash the bottle and crystalline precipitate with diluted alcohol in successive small portions until 1000 Gm. (or $2\frac{1}{2}$ lbs. av.) of clear solution have been obtained. This liquid is then to be evaporated on a water-bath at a moderate temperature until all the alcohol has been dissipated, and sufficient distilled water added to make the product weigh 1000 Gm. (or 2 lbs. 3 oz. av. + 120 grains).

Sp. gr. about 1.106 at 25°C . (77°F).).

Average dose.—0.5 Cc. (8 minims).

Diluted hydriodic acid, owing to its instability is seldom prescribed, but the freshly made solution is used in making some medicinal preparations.

ACIDUM HYDROBROMICUM. Hydrobromic Acid.

$\text{HBr}=80.36$.

Preparation. Hydrobromic acid is a solution of the gaseous acid, HBr , in water. It is generally made by manufacturing chemists by passing a current of hydrogen sulphide (sulphuretted hydrogen gas) through a solution of bromine in water, distilling and then concentrating or diluting the distillate to the required percentage of real acid.

Concentrated Hydrobromic Acid is 34% real acid, sp. gr. 1.303, and is used chiefly for chemical combinations or for diluting to make diluted hydrobromic acid, 10%. For this purpose 10 parts by weight, are mixed with 24 parts of distilled water. See *Acidum Hydrobromicum Dilutum*.

The Germ. official hydrobromic acid is 25% real acid strength, sp. gr. 1.208. It all other pharmacopœias the acid strength corresponds with the U. S. diluted hydrobromic acid, 10%, sp. gr. 1.076.

Hydrobromic acid, 34%, is just one half the bromine strength of potassium bromide and may be prescribed in place of this salt, using double the quantity.

Acidum Hydrobromicum Gasiforme. This is prepared by heating together in a retort, on a sand-bath, paraffin 300 Gm., bromine 100 Gm. The gas which rises through a U tube connected with a bulb wash-tube containing a little water and then through a second U tube containing fragments of red phosphorus mixed with broken glass which has been moistened with water, into a large receiver, where the purified gas is collected.

Bromic Acid. HBrO_3 . This is an oxygen acid of bromine. It is generally made by manufacturing chemists 15% acid strength, sp. gr. 1.12, and is used chiefly for making **Bromates** which are oxyacid salts produced by the combination of this acid with bases; as potassium bromate, KBrO_3 .

ACIDUM HYDROBROMICUM DILUTUM. U. S., Br.

Diluted Hydrobromic Acid.

"A liquid composed of not less than 10 percent., by weight, of absolute Hydrobromic Acid, [$\text{HBr}=80.36$], and about 90 percent. of water." <U. S.

"An aqueous solution containing 10 percent., by weight, of hydrogen bromide, HBr . It may be obtained by the distillation of potassium bromide with concentrated phosphoric acid." <Br.

Preparation. This acid may be prepared by passing a current of hydrogen sulphide, (sulphuretted hydrogen gas) through a solution of bromine 1 part, in water 15 parts; distilling and diluting to a 10 percent. solution, or by distilling potassium bromide with concentrated phosphoric acid as recommended in the Br. P. As these processes are inconvenient for most pharmacists, the following, which makes a preparation sufficiently pure for most purposes, is submitted:

Potassium Bromide,	3 ounces av.
Tartaric Acid,	3 $\frac{5}{8}$ ounces av.
Distilled Water,	16 fl.ounces

Dissolve the salts, each in 8 fl.ounces of the water and mix the solutions, allow to stand in a cold place for 2 hours, then decant the clear liquid and filter. If these solutions are mixed, cream of tartar is thrown down, and if set in a very cold place is almost entirely precipitated from the liquid. A little free tartaric acid remains in the liquid but is not objectionable for most uses.

Diluted hydrobromic acid may also be made with concentrated hydrobromic acid, (34%), 10 Gm. (or 1 ounce av.); distilled water, 24 Gm. (or 2 ounces av.+195 grains). Mix them. This makes a pure acid of the standard official strength, 10%.

Characteristics. Diluted hydrobromic acid is colorless, odorless, and has a sharp acid taste. Its sp. gr. at 25°C. (77°F.) is 1.076. It evaporates without residue and mixes in all proportions with water and alcohol.

Medicinal Uses. In medicine this acid has the same general effect as the bromide salts, but, on account of its acid qualities is liable to irritate the stomach if its use is long continued. A fl.drachm is equivalent to 9 grains of potassium bromide and is a fair dose when largely diluted with water. It is an excellent solvent of quinine salts.

Average dose.—4 Cc.=1 fl.drachm.<U. S.

Acide Bromohyrique Dissous. Fr. Codex. This is the same as hydrobromic acid, and is prepared by heating together in a retort, barium bromide 50 Gm., distilled water 100 Gm., sulphuric acid 15 Gm., and collecting the vapor in water contained in a receiver. It may be made of varying percentages, sp. gr. corresponding to the U. S. Diluted Hydrobromic Acid 10%.

ACIDUM HYDROCHLORICUM. U. S., Br. Hydrochloric Acid.
Muriatic Acid.

"A liquid composed of 31.9 percent., by weight, of absolute Hydrochloric Acid [$\text{HCl}=36.18$], and 68.1 percent. of Water." <U. S.

Sp. gr. about 1.158 at 25°C. (77°F.).

"A liquid containing 31.79 percent., by weight, of hydrogen chloride, HCl , and 68.21 percent. of water. Obtained by dissolving in water the gas produced by the interaction of sulphuric acid and sodium chloride." <Br. Sp. gr. 1.160 at 60°F.

This acid was discovered by the celebrated alchemist, Glauber, in the seventeenth century. Official in all pharmacopœias.

Hydrogen chloride, HCl , is a gaseous acid which, when dissolved in water, is the hydrochloric or muriatic acid of commerce. The above official standards represent the C. P. acids, while the commonly known muriatic acid is generally of less real acid percentage and contains some impurities. This is largely used in the arts.

The U. S., Br. and Jap. official standard for this acid is very nearly the same. The Fr. is 35.2%, the Sp. 35.1%. The other pharmacopœias are mostly about 26.5%. This difference should be observed in preparing foreign formulas.

Preparation. No process for preparing the acid is now official; but the Br. P. of 1885 gave the following: "Take of chloride of sodium, dried, 48 ounces av., sulphuric acid 44 fl.ounces, distilled water 50 fl.ounces. Pour the sulphuric acid slowly into 32 fl.ounces of water and when the mixture has cooled, add it to the chloride of sodium, previously introduced into a flask having the capacity of at least one gallon. Connect the flask by corks and a bent glass tube with a three necked wash-bottle furnished with a safety tube and containing the remaining 4 fl.ounces of water; then applying heat to the flask, conduct the distilled water, by means of a bent tube dipping about one half inch below the surface, and let the process be continued until the product measures 64 fl.ounces or the liquid has acquired a sp. gr. of 1.16. The bottle containing the distilled water must be kept cool during the whole operation."

While the above is a process that may be employed in the laboratory, muriatic acid is commercially produced as a by-product of the manufacture of sodium sulphate, used for making soda ash, and is supplied by the manufacturing chemists of different degrees of acid strength for use in the arts, the manufacture of chemical salts and in medicine.

Properties. Chemically pure hydrochloric acid, which is designed to be used in pharmacy, is colorless and has an acid, salty taste when diluted. The U. S. or Br. official acid has sp. gr. about 1.16. When heated it disengages hydrochloric acid gas until its sp. gr. is reduced to 1.094, when it remains unchanged by boiling until it is entirely

vaporized. A ready test of this acid is to pour a few drops on blotting paper, and a few drops of water of ammonia close beside it, the vapors rising from each unite and form a cloud of ammonium hydrochloride vapor.

Uses. In the arts commercial hydrochloric acid, which consists of one volume each of hydrogen and chlorine dissolved in water, is largely employed for bleaching because of the facility with which its chlorine is disengaged. It is also employed in the manufacture of a great variety of chemicals useful in the arts and in medicine. In medicine it is seldom used except in dilution.

Hydrochlorates or Hydrochlorides. Salts prepared by combining an organic base with hydrochloric acid were formerly called **hydrochlorates** but the title now official in the U. S., Br. and most recent pharmacopœias is **hydrochloride** instead. This is the more proper chemical term for a salt in which the hydrogen of the hydrochloric acid molecule is not displaced by the basic substance. For example: the alkaloid, cocaine, has the formula $C_{17}H_{21}NO_4$, and cocaine hydrochloride has the formula $C_{17}H_{21}NO_4 HCl$, the HCl molecule being simply joined with the cocaine molecule without being broken up and recombining as is the case when inorganic bases combine with hydrochloric acid forming chlorides.

Chlorides are chemical combinations of hydrochloric acid with inorganic bases, in which the hydrogen atom of the acid molecule is displaced by a basic substance, as ferric chloride, $Fe_2Cl_6 \cdot 12H_2O$. Chlorides also result from the direct union of chlorine gas with bases and the interaction of chlorine salts in solution with other salts of weaker chemical affinity. (See Chlorine).

CHLOR-ACETIC ACIDS.

Chlorine (gas) combines with acetic acid to form three compound acids known as **Monochloracetic Acid**, $C_2H_3ClO_2$, **Dichloracetic Acid**, $C_2H_2Cl_2O_2$ and **Trichloracetic Acid**, $C_2HCl_3O_2$, the latter being official in the Ph. Ger. under the title *Acidum Trichloraceticum*, *Trichloresigsäure*, and in the U. S. *Acidum Trichloraceticum*.

These acid are supplied by manufacturing chemists, the mono- and tri- in the form of crystals, which readily deliquesce, and the di- in a colorless liquid. They are powerful caustics and are chiefly used for destroying warts, papilloma, spongy gum, in dentistry, and other abnormal growths. By combinations with bases they form salts having the characteristics of chlorides and acetates.

Acetyl Chloride. CH_3COCl . A chemical combination of sp. gr. 1.15, boiling at $55^\circ C$. A colorless liquid which, in the presence of water is decomposed, yielding hydrochloric and acetic acids. It has been recommended as a digestive in place of hydrochloric acid as it so readily decomposes in presence of water, furnishing hydrochloric acid to the stomach.

Acetocaustin. This is a 50 percent. solution of trichloracetic acid with water. It is used as a caustic for corns, warts etc.

ACIDUM HYDROCHLORICUM DILUTUM. U. S., Br.

Diluted Hydrochloric Acid. Diluted Muriatic Acid.

"Diluted Hydrochloric Acid should contain 10 percent., by weight, of absolute Hydrochloric Acid [$\text{HCl}=36.18$], and 90 percent. of water." < U. S.

The U. S. formula is

Hydrochloric Acid, 100 Gm. or 1 ounce av.

Distilled Water, 219 Gm. or $2\frac{1}{2}$ ounces av.

Mix them. Keep the product in glass-stoppered bottles. Representing 10 percent. of absolute hydrochloric acid, sp. gr. at 25°C . (77°F .) about 1.049.

"100 parts by weight should contain 10.58 parts of hydrogen chloride, HCl ." < Br.

The Br. P. formula is

Hydrochloric acid 6 fl.ounces, (more exactly 3063 grains), or 350.1 Gm. Distilled water a sufficient quantity. Introduce the hydrochloric acid into a glass flask, the capacity of which to a mark on the neck is 20 fl.ounces Imperial measure, (or 1000 Cc.), add the distilled water until the measure at 15.5°C . (60°F .) after it has been shaken, measures 20 fl.ounces, Imperial measure, (or 1000 Cc.). 100 parts by weight should contain 10.58 parts of hydrogen chloride, HCl , sp. gr. at N. T. 1.052. It will be observed that the hydrochloric acid directed to be used in this formula is the Br. standard which varies slightly from the U. S., but the resultant preparation is almost identical in real acid percentage.

Medical Uses and Dose. Diluted hydrochloric acid is considerably prescribed as a tonic for liver troubles and in some forms of indigestion and dyspepsia. The usual dose of the U. S. or Br. preparation is from 10 to 30 minims (0.65 to 2 Cc.) largely diluted with water.

Average dose.—1 Cc. (15 minims).

ACIDUM HYDROCYANICUM.

Hydrocyanic Acid. Prussic Acid.

HCN or $\text{HCy}=26.84$.

This gaseous acid, HCN , was discovered by Scheele (1789) in the production of Prussian blue, but was first isolated as an **anhydride cyanogen**, $(\text{CN})_2$, by Gay-Lussac, in 1814. Commercially it is prepared by several different methods, suited only to the manufacturing chemists laboratory, and is furnished in concentrated solution for chemical purposes; but for medicinal use the diluted acid (2%) only, is used. The formula for the diluted hydrocyanic acid is official in the U. S. P., and the **diluted** acid only should be dispensed when hydro-

cyanic acid is prescribed. The concentrated solutions are deadly poisons, and as the dilute acid is the only form known in medicine, it sometimes occurs that physicians write hydrocyanic acid, only, when they intend to prescribe the official 2% acid.

Cyanides, also known as "Prussiates," are combinations of hydrocyanic acid with bases—as potassium cyanide, KCN, zinc cyanide etc., the hydrogen atom being replaced by the basic atom.

Cyanic Acid, HCNO or HCyO. **Cyanogen Hydroxide**.

When potassium cyanide is fused with certain metallic oxides, as, for example, with powdered lead oxide, the oxide is decomposed leaving the metal free, while the oxygen is combined with the cyanide salt forming potassium cyanate. If lead oxide is used a globule of melted lead will be found at the bottom of the fused salt, while cyanic acid has formed with potassium.

Cyanates. Salts in which the hydrogen of cyanic acid is displaced by a metal or other basic substance are called cyanates, as potassium cyanate, KCNO. Cyanates are properly oxides of cyanides.

Cyanogen (CN)₂ is the anhydrous gas which, when combined with hydrogen forms hydrocyanic acid, and when combined with hydrogen and oxygen forms cyanic acid, cyanogen hydroxide.

ACIDUM HYDROCYANICUM DILUTUM. U. S., Br.

Diluted Hydrocyanic Acid.

"A liquid composed of not less than 10 percent., by weight, of absolute Hydrocyanic Acid, HCN, and about 98 percent. of water." < U. S.

"An aqueous solution containing 2 percent., by weight, of hydrogen cyanide, HCN. It may be prepared by the interaction of diluted sulphuric acid and potassium ferrocyanide." < Br.

The U. S. 7th revision, gave the following formula for the preparation of this acid solution:

Potassium Ferrocyanide, in coarse powder,	20 Gm.
Sulphuric Acid,	8 Cc.
Water,	65 Cc.
Distilled Water, a sufficient quantity.	

Place the potassium ferrocyanide in a tubulated retort and add to it 40 Cc. of water. Connect the neck of the retort (which is to be directed upward) by means of a bent tube, with a well-cooled condenser, the delivery tube of which terminates in a receiver surrounded with ice-cold water, and containing 65 Cc. of distilled water. All the joints of the apparatus, except the neck of the receiver, having been made air-tight by means of well-fitting corks, pour into the retort through the tubulure, the sulphuric acid, previously diluted with 25 Cc. of water. Gently mix the contents of the retort, and heat it in a sand-bath, so as to keep the liquid in brisk ebullition, until about one-half

of its volume has passed over into the receiver. Detach the receiver and assay a small portion of the contents. Then add to the remainder so much distilled water as may be required to bring the product to 2 percent., by weight, of absolute hydrocyanic acid.

The present U. S. formula is as follows:

"It may be prepared extemporaneously by the following process:

Silver Cyanide,	6 Gm. or 93 grains
Diluted Hydrochloric Acid,	15.54 Cc. or 245 minims
Distilled Water,	44.10 Cc. or 716 minims

Mix the diluted hydrochloric acid with the distilled water, add the silver cyanide and shake the whole together in a glass-stoppered bottle. When the precipitate has subsided pour off the clear liquid."

<U. S. Eighth revision.

Average dose.—0.1 Cc. (1½ minims).

Acidum Hydrocyanicum (Scheele), B. P. C. 1901.

Potassium Ferrocyanide,	2¼ ounces
Sulphuric Acid,	1 fl.ounce
Distilled Water,	24 fl.ounces

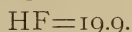
(or a sufficient quantity).

A 4% acid is prepared in the same manner as is directed in the U. S. 7th revision formula. It is a colorless liquid, sp. gr. 0.994. Dose, 1 to 3 minims.

Note that this is double the acid strength of the U. S. or Br. official diluted hydrocyanic acid.

ACIDUM HYDROFLUORICUM. Hydrofluoric Acid.

Hydrogen Fluoride.



This acid was discovered by Scheele in 1771, but was not obtained pure until 1808 by Gay-Lussac and Thénard. Owing to its action on glass, it is supplied by manufacturing chemists in lead, gutta-percha or ceresine bottles. It is used in the arts for etching upon glass and porcelain, but is not employed in medicine.

Preparation. Concentrated sulphuric acid is poured on finely powdered fluorspar contained in a capacious leaden retort. Gentle heat is then applied, and the gas which is evolved—hydrogen fluoride (anhydrous),—is collected in a small quantity of water contained in a leaden receiver which must be surrounded by ice. This acid vaporizes at 59°F. and must be kept in a cool place, closely stopped. It is a powerful caustic, and care must be exercised in handling it.

This acid is furnished by manufacturing chemists of 55% (known as concentrated) and 30% strength of true acid.

Fluorides. Hydrogen fluoride reacts with many elements and basic substances, forming salts known as fluorides.

ACIDUM HYDROFLUORICUM DILUTUM. B. P. C.**Diluted Hydrofluoric Acid.**

Redistilled Hydrofluoric Acid, (containing about 30% of true acid), 58 grains; distilled water, a sufficiency.

Weigh the acid in a gutta-percha or paraffin coated bottle, and pour it into 15 fl.ounces of distilled water. Rinse out the bottle with three successive portions of distilled water, each measuring one fl.ounce, and add the several rinsings to the previous volume. Adjust the solution so that 10 Cc. require for neutralization 10 Cc. of the decinormal volumetric solution of sodium hydroxide, corresponding to 0.20 percent. of hydrofluoric acid. Preferably stored in gutta-percha bottles. Dose, 5 to 20 minims.

ACIDUM HYPOPHOSPHOROSUM. U. S.**Hypophosphorous Acid.**

"A liquid composed of 30 percent., by weight, of absolute Hypophosphorous Acid [$\text{PO}\cdot\text{H}_2(\text{OH})=65.53$], and 70 percent. of water." <U. S.

The U. S. P. gives no formula for making this acid but the B. P. C. Formulary, 1901, gave the following:

Barium Hypophosphite [containing not less than 95% $\text{Ba}(\text{PH}_2\text{O}_2)_2$],

8 ounces

Diluted Sulphuric Acid,

Distilled Water, of each, a sufficient quantity.

Dissolve the barium hypophosphite in 36 fl.ounces of hot distilled water. Add slowly to the solution 17 fl.ounces of diluted sulphuric acid, after which continue the addition drop by drop until no further turbidity is produced (which indicates that all the barium has been precipitated as barium sulphate). Set aside in a warm place and pass the clear liquid through a filter. Wash the precipitate by decantation with successive portions of hot distilled water, until the washings have no longer an acid reaction. Filter, unite the filtrates and evaporate the liquid on a water-bath to the prescribed density. The product will weigh about $11\frac{1}{2}$ ounces. Sp. gr. 1.1367. Real acid strength, 30%. Dose, 2 to 5 minims.

Manufacturing chemists furnish a preparation corresponding to this of 30% acid strength.

Hypophosphites. Hypophosphorous acid combines with metals and alkaloids, forming salts known as hypophosphites, a number of which are considerably used in medicine.

ACIDUM HYPOPHOSPHOROSUM DILUTUM. U. S.

If the hypophosphorous acid, as made by the preceding formula is used, 1 ounce by weight mixed with 2 ounces of distilled water will produce diluted hypophosphorous acid, 10%, of the U. S. P. standard.

Manufacturing chemists furnish a hypophosphorous acid of 50% strength from which the dilute acid may be made by mixing 20 parts by weight, (or 2 ounces av.) with 80 parts by weight, (or 8 ounces av.) of distilled water. Diluted hypophosphorous acid may also be made by the following formula which was proposed by Proctor (1858).

Calcium Hypophosphite,	480 grains
Oxalic Acid,	350 grains

Distilled Water, a sufficient quantity.

Dissolve the hypophosphite salt in 6 ounces and the oxalic acid in 4 ounces of water, separately, and mix the solutions. When the precipitate (calcium oxalate) has subsided, pour off the supernatant liquid and reserve; transfer the moist precipitate to a filter, pour upon it 3 ounces of water and, when it has ceased to drop, add the liquid to the reserved portion and filter; then evaporate the filtrate to 8½ fl.ounces. This contains about ten percent. of real acid and is used chiefly in combination with solutions and syrups of hypophosphites. It may, however, be prescribed in doses of ½ to 1 fl.drachm.

Average dose.—0.5 Cc. (8 minims).

ACIDUM LACTICUM. U. S., Br. Lactic Acid.

$\text{HC}_3\text{H}_5\text{O}_3=89.37$, U. S. $\text{CH}_3\cdot\text{CHOH}\cdot\text{COOH}$, Br.

"A liquid organic acid composed of not less than 75 percent., by weight, of absolute Lactic Acid [$\text{CH}_3\cdot\text{CHOH}\cdot\text{COOH}=89.37$], and 25 percent. of water." <U. S. Sp. gr. 1.206 at 25°C. (77°F.).

"A liquid containing 75 percent. of hydrogen lactate, with 25 percent. of water. It may be produced by the fermentation of lactose." <Br. 1898. Sp. gr. 1.21.

This acid was discovered by Scheele. It was for a long time confounded with acetic acid which it resembles. It is the acid of sour milk, and is found in the gastric juice, and in several of the secretions and liquid ferments. It is caused by a peculiar ferment, and is the natural conclusion of the fermentation of milk-sugar, (lactose) the same as acetic acid is the conclusion of the fermentation of cane-sugar, (saccharose).

Preparation. Whey from sour milk is sweetened slightly by the addition of milk sugar and fermented at a temperature of from 70° to 80°F. until lactic acid has developed as much as it will. The liquor is then evaporated to about one-third of its volume, decanted and filtered and saturated with milk of lime. Calcium lactate remains in solution while calcium phosphate is precipitated. The liquor is filtered and a saturated solution of oxalic acid added to the filtrate which precipitates calcium oxalate and frees lactic acid which remains in solution. This solution is filtered, concentrated and treated with alcohol which dissolves out the lactic acid and precipitates milk

sugar and certain salts; the solution is separated from the precipitate and the alcohol distilled off, leaving pure lactic acid which is concentrated by evaporation to the required sp. gr. 1.210 or 1.220. There are several other methods of fermenting and separating this acid, but all of them involve considerable labor and chemical manipulation.

Medicinal Uses. In pharmacy lactic acid is employed to produce lactates, and, either alone, or combined with other acids, is used for dissolving certain salts, making solutions, syrups etc., as lacto-phosphates etc.

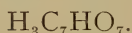
Dose.—From 15 to 60 minims (1 to 4 Cc.), diluted largely with water.

Average dose.—2 Cc. (30 minims).

Diluted Lactic Acid which was introduced into the 1885 Br. P. is now dismissed. The formula was 3 measures of lactic acid, mixed with 17 measures of distilled water.

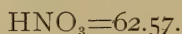
Lactates. Lactic acid combines readily with bases forming **lactates**, several of which are considerably used in medicine. In combination with phosphoric acid it is used to produce lacto-phosphate salts, syrups or solutions.

ACIDUM MECONICUM. Meconic Acid.



This acid was official in the Br. P. 1885, but has been dismissed. It is one of the acids obtained from opium and forms by its union with bases a number of salts known as **Meconates**, which are sometimes employed in medicine. Opium contains over 5 percent. of this acid.

ACIDUM NITRICUM. U. S., Br. Nitric Acid.



The discovery of this acid is attributed to Raymond Lulle by whom it was distilled A. D. 1225. Some authorities state that a dilute nitric acid was known to the Arabians as early as the eighth century.

"A liquid composed of 68 percent., by weight, of absolute nitric acid, HNO_3 , and 32 percent. of water." < U. S. Sp. gr. 1.403; boils 120.5°C . (248°F).)

"A liquid containing 70 percent., by weight, of hydrogen nitrate, HNO_3 , and 30 percent. of water, prepared by the interaction of sulphuric acid and potassium or sodium nitrate." < Br. Sp. gr. 1.42; boils at 250°F . (121°C).)

Nitric acid of commerce is a solution of the vapor, nitric oxide, N_2O_5 , in water. $\text{N}_2\text{O}_5 + \text{H}_2\text{O} = (\text{HNO}_3)_2$; and is the most highly oxidized of the five compounds of nitrogen and hydrogen. The official acid is known as C. P. Nitric Acid.

The U. S. and Br. official acids nearly correspond in acid strength. The Nedl., Mex., Ital. and Sp. standard is nearly the same.

The Fr. **Acide Azotique officinal** has sp. gr. 1.390, making it about 63 percent.

The Germ. and most of the other European pharmacopœias are about 25% real acid strength. These differences should be observed in preparing foreign formulas.

Aqua Fortis, which is used in the arts, is found in commerce as **single**, (sp. gr. 1.22), and **double**, (sp. gr. 1.36), the latter being double the acid strength of the former.

Acidum Nitricum Crudum is the common acid of commerce containing about 61% of real acid.

Acidum Nitricum Fumans. Acidum Nitrico-Nitrosum is official in several of the European pharmacopœias. It is a clear, brownish-red liquid, emitting suffocating yellowish fumes when warmed. 100 parts contain 86 parts real acid, its sp. gr. is from 1.486 to 1.500. It is chiefly used by manufacturing chemists and should be handled carefully.

Preparation. In a small way nitric acid may be prepared by adding to coarsely powdered potassium nitrate, in a retort, an equal weight of strong sulphuric acid. The retort should be of sufficient capacity to hold at least one-third more than the quantity of material it contains. A receiver containing a little water is then arranged and heat applied, moderately at first, and gradually increased when the mass begins to fuse, so that it may all be well combined and in a state of complete fusion. The vapor which first arises is red; this color disappears during the distillation, to appear again towards its close, from which it may be known that the interaction is completed. The acid thus obtained is of uncertain strength and the process is only given for experimental purposes; commercially, the materials and processes employed are quite different. The ordinary commercial acid used in the arts is considerably weaker in acid strength than the official, having sp. gr. from 1.30 to 1.41, while the strongest procurable has sp. gr. 1.43. Concentrated nitric acid has, however, been prepared experimentally, that contains more than 90 percent. of absolute acid.

Medicinal Uses. As the molecule of nitric acid contains a greater proportion of oxygen than any other acid it is obvious that it may be used whenever it is desirable to increase oxygen in the circulating fluids of the body. It acts as a tonic, astringent and antiseptic and is especially useful in impoverished condition of the blood, internal lack of tone, chronic diarrhœa etc. For internal use the dilute acid is used. The strong acid is employed as a caustic for fungus growths, chancre, warts etc., also very largely diluted, as a lotion for ulcers and morbid sores.

Nitrates. Nitric acid combines with most all metallic bases and alkaloids, forming salts called nitrates. These salts are largely used

in medicine and in the arts. In the formation of nitrates, the base takes the place of the hydrogen atom, as KNO_3 , the potassium displacing the hydrogen in the acid, HNO_3 , and forming potassium nitrate, KNO_3 . Nitrates are extensively used in the production of explosives and pyrotechnics.

ACIDUM NITRICUM DILUTUM. U. S., Br.

Diluted Nitric Acid.

The present U. S. formula is

Nitric Acid,	100 Gm. or 2½ fl.ounces
Distilled Water,	580 Gm. or 14½ fl.ounces

To make 680 grammes or 17 fl.ounces.

Mix them. Keep the product in dark amber-colored, glass-stoppered bottles. Representing 10 percent. of absolute nitric acid. Sp. gr. about 1.057 at N. T.

Dose.—15 to 30 minims. (0.5 to 1 Cc.).

The Br. P. formula is

Nitric acid, 3 fl.ounces and 7 drachms (more exactly 3.86 fl.ounces or 2400 grains), or 193.2 Cc. or 274.3 grammes, distilled water a sufficient quantity.

Introduce the nitric acid into a glass flask, the capacity of which to a mark on the neck is 20 fl.ounces (or 1111 Cc.); add distilled water until the mixture at 60°F. (15.5°C.), measures the required quantity. The Br. Preparation contains 17.44 parts of hydrogen nitrate by weight, in 100 parts of liquid. Sp. gr. 1.101.

Dose.—5 to 20 minims.

It will be noted that the Br. preparation is nearly 1¾ the acid strength of the U. S. and it is important in compounding Br. formulas and prescriptions that the acid of the Br. official strength be used.

The Fr. and Ger. authorities have no preparation corresponding to either of the above.

ACIDUM NITROHYDROCHLORICUM. U. S.

Nitrohydrochloric Acid. Nitromuriatic Acid.

The U. S. P. directs

Nitric Acid,	180 Cc. (or 1½ fl.ounces)
Hydrochloric Acid,	820 Cc. (or 5½ fl.ounces)

To be mixed together in a capacious glass vessel.

This acid is the aqua regia of the alchemist and earlier chemists, so called because it dissolved gold (in the form of gold leaf). It is used chiefly for that purpose. In medicine only the dilute acid should be used.

Acidum Chloronitrosus. Aqua Regia. The same as Acidum Nitrohydrochloricum, U. S., which see.

ACIDUM NITROHYDROCHLORICUM DILUTUM. U. S., Br.**Diluted Nitrohydrochloric Acid. Diluted Nitromuriatic Acid.**

The present U. S. P. directs

Nitric Acid,	40 Cc. (or parts by measure)
Hydrochloric Acid,	182 Cc. (or parts by measure)
Distilled Water,	778 Cc. (or parts by measure)

Mix the acids in a capacious glass vessel and, when effervescence has ceased, add the distilled water. The finished preparation contains about 11.8 percent. of real acids. The dose internally is from 10 to 20 minims (0.6 to 1.25 Cc.) in water.

The Br. 1898 describes it as "An aqueous solution of free chlorine, hydrochloric, nitric and nitrous acids."

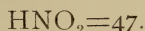
Nitric Acid,	60 Cc. (or 3 fl.ounces)
Hydrochloric Acid,	80 Cc. (or 4 fl.ounces)
Distilled Water,	500 Cc. (or 25 fl.ounces)

Mix the acids with the distilled water and keep the mixture in a glass-stoppered bottles for 14 days before it is used. Sp. gr. about 1.07.

Dose.—5 to 20 minims.

It will be observed that there is a great dissimilarity in the proportions of the acids used in the U. S. and Br. formulas. It is therefore necessary to use the one naturally required in compounding medicines.

Acidum Chloronitrosum Dilutum. The same as the U. S. Diluted Nitro-hydrochloric Acid. It is official under the title Acidum Nitro-hydrochloricum Dilutum in the U. S. and Br. Ph.

ACIDUM NITROSUM. Nitrous Acid.

Nitrous acid is an aqueous solution of nitrous anhydride, N_2O_3 , of rather unstable composition. It is always present in commercial nitric acid, and may be shown by heating nitric acid in an evaporating dish, when red, nitrous fumes arise. It is somewhat used in the arts as an oxidizing agent, but is seldom employed in medicine. It is the acid constituent of nitrites, of which a number are official.

Nitrites are combinations of nitrous acid with bases. Sodium nitrite is now official in the U. S. P. Nitrite salts when exposed to the air, by absorbing oxygen, change to nitrates.

ACIDUM OLEICUM. U. S., Br. Oleic Acid.

"A monobasic, organic acid prepared in sufficiently pure condition by cooling commercial oleic acid to about 5°C . (41°F .) then separating and preserving the liquid portion." <U. S. Sp. gr. about 0.895 at 25°C . (77°F .)

"Oleic acid, or hydrogen oleate, is obtained by the saponifying action of alkalies and subsequent action of acids, or by the action of

superheated steam on the olein of fats. Usually not quite pure." <Br. Sp. gr. 0.890 to 0.910.

Preparation. In the manufacture of candles from tallow, the solid fatty acids,—stearic and palmitic—are separated by various treatment, leaving a residue commercially known as "red oil" which is impure oleic acid. This oil is chilled by exposure to a temperature of about 5°C. (41°F.) when portions of stearic and palmitic acids remaining in the oil are congealed and removed by straining and pressure. The liquid oil is then shaken with sulphurous acid, washed thoroughly and filtered, when a fairly pure oleic acid is obtained. So many manipulations and difficulties attend the preparation of pure oleic acid that its manufacture may well be given over to the manufacturing chemist.

Properties. Pure oleic acid is a liquid of pale yellow color, having but little odor or taste and a neutral or slightly acid reaction. It is insoluble in water, but dissolves readily in alcohol, chloroform or ether, and mixes freely with fixed or volatile oils. It combines readily with sodium, potassium and ammonium hydrates, forming oleates familiarly known as soap. With a solution of potassium hydrate it produces "soft soap" (potassium oleate), and with sodium hydrate it produces "hard soap" (sodium oleate). With the oxides of certain metals it combines forming oleates, as mercury oleate, (with yellow mercuric oxide) and zinc oleate, (with zinc oxide). With the alkaloïds oleic acid combines forming oleates, as morphine oleate, veratrine oleate etc. (See Oleates). The oleates were not well known until 1872, when they were introduced to the medical profession by Prof. Marshall, who furnished formulas for their preparation.

Uses. Oleic acid is employed in pharmacy chiefly for the production of oleates which are useful galenicals, being used as applications similar as ointments, cerates and liniments. It is not yet well enough known to be established in the place which it deserves in medicine.

Oleates are combinations of bases with oleic acid. The chemical combination of oleates with bases is known as **saponification**. (See Oleates).

ACIDUM OSMICUM. Osmic Acid. Perosmic Acid.



A crystalline, volatile, very odorous compound obtained by the action of nitrohydrochloric acid upon osmium or its lower oxides, OsO , Os_2O_3 , Os_2OsO_3 . It is a powerful oxidizing agent, its vapor being very irritating. It and its salts, as potassium osmate, have been successfully used in dilute solution, 1:1000, in sciatica and rheumatism, by hypodermic injection, and a 10% solution as an application to morbid growths has proven effectual.

ACIDUM OXALICUM. Oxalic Acid.

Crystals, $\text{H}_2\text{C}_2\text{O}_4 + 2\text{H}_2\text{O} = 126$. Dry, $\text{H}_2\text{C}_2\text{O}_4$.

Although oxalic acid is not official in the U. S. or Br. pharmacopœias it is extensively used in the arts and considerably used in chemical and pharmaceutical processes, also as a normal volumetric test solution

It was noticed by Duclos as early as 1668, but was first made known by Bergmann in 1776. It exists in a considerable number of plants in the state of an oxalate and in the same state is found in urinary calculi. In a free state it is found in the leaves of certain plants and in fungi. It occurs in the oxidation of acetylene, ethylene and other hydro-carbons, by potassium permanganate.

Preparation. Commercially oxalic acid is produced by the action of nitric acid on sugar and starch or molasses. The starch or sugar is heated with an equivalent quantity of nitric acid in a suitable flask or retort until all effervescence has ceased. The solution is then concentrated by evaporation and oxalic acid separates in the form of crystals upon cooling. It is also prepared from sawdust or shavings by heating them with potassa or a mixture of soda and potassa for several hours at a temperature of 200° to 220°C . and then separating the acid by treating with sodium carbonate and milk of lime.

Properties. Oxalic acid is one of the most powerful of organic acids and is therefore considerably used in chemical interaction to separate carbonic acid and many other acids from their combination with bases, and as it combines readily with lime forming calcium oxalate which is very insoluble it, in turn, may be very easily separated from its combination with other bases, leaving them in solution while the calcium oxalate is precipitated.

It is extensively used for bleaching straw for making hats etc., and in cotton printing for discharging colors, also for soluble blue with Prussian blue, used for bluing. It is also employed for polishing marble and in whitening wood, leather and other substances. Combined, 4 parts with 1 of potassium carbonate it forms the **quadroxalate of potassium**, or salts of lemon or sorrel, commonly used for removing stains of iron rust, ink and fruit from linen.

Oxalates are compounds of oxalic acid with bases forming salts, of which a very few are used in medicine, cerium oxalate being now official, and ferrous oxalate having been official.

ACIDUM PHOSPHORICUM. U. S. Phosphoric Acid.

$\text{H}_3\text{PO}_4 = 97.29$.

This acid was discovered by Margraff in 1740. It exists in the three kingdoms of nature; but is obtained commercially chiefly from the bones of mammals.

"A liquid composed of 85 percent., by weight, of absolute orthophosphoric acid (H_3PO_4), and not more than 15 percent. of water." <U. S. Sp. gr. not below 1.07 at 25°C . (77°F)."

Syrupy phosphoric acid is the same as the U. S. official, 85 percent.

It will be observed that the standard of real acid in the leading pharmacopœias varies greatly, and it will be necessary in compounding medicines to use the standard required in the country in which the formula is written.

The important change in the acid strength of phosphoric acid from 50 to 85 percent. in the 1890 U. S. P. should be well understood as the change affects all preparations in which phosphoric acid is a constituent. The sp. gr. of the present official acid is not below 1.707 at 25°C . (77°F .) and it should require not less than 17 Cc. of normal potassium hydrate V. S. (each Cc. corresponding to 5 percent. of the absolute acid) to neutralize 0.978 grammes of the acid diluted with water, phenolphthalein being used as an indicator. This acid when purchased of manufacturing chemists should bear a label stating its percentage of real acid. (85 percent.).

The Fr., Ital., Mex. and Sp. official phosphoric acids are about 50% acid strength, sp. gr. 1.35. The Germ., Nedl. and Russ. standard is 25% real acid, sp. gr. about 1.154. Most other European standards correspond to the U. S. diluted phosphoric acid, 10%.

Preparation. Phosphoric acid may be prepared by slow atmospheric oxidation of phosphorus or by the action of nitric acid diluted with an equal volume of water on phosphorus contained in a capacious retort which is heated carefully on a sand-bath until all the phosphorus is dissolved. The liquid is then to be concentrated by evaporation to the required sp. gr. Considerable care is required in making the acid to so regulate the heat as to prevent too violent action which might result in an explosion.

Properties. Phosphoric acid, U. S. or concentrated phosphoric acid, Br., are chiefly used for making phosphate salts or phosphate solutions or for making diluted phosphoric acid which is used in medicine or prescribed by physicians. This is the **orthophosphoric** or **tribasic** phosphoric acid which is derived from phosphoric oxide or anhydride, P_2O_5 , the highest oxidation of phosphorus. When phosphorus is burned, either by fast or slow combustion, phosphoric oxide or anhydride results; phosphoric acid is the solution of this oxide in boiling water. It is miscible in all proportions with water or alcohol. When heated it loses water and at 200°C . (392°F .) it begins to change to **pyrophosphoric acid**, $\text{H}_4\text{P}_2\text{O}_7$, which change is completed at 213°C . (415.4°F .). Increased to a red heat or the point of ignition it is changed to **metaphosphoric acid**, HPO_3 , which, upon cooling, forms a transparent mass known to commerce as **glacial phosphoric acid**. When it has assumed this state it contains 11.2 percent. of water in combina-

tion with 88.8 percent. of phosphoric oxide or anhydride. This is **monohydrated** or **monobasic phosphoric acid**.

Uses. Phosphoric acid is only used in medicine in dilution (see *Acidum Phosphoricum Dilutum*) but is employed in pharmacy as a solvent in many pharmaceutical and chemical operations.

Phosphates. The chemical reaction of phosphoric acid with metallic and organic bases results in formation of salts called phosphates. These salts are very numerous, and are much employed in medicine.

ACIDUM PHOSPHORICUM CONCENTRATUM. Br.

Concentrated Phosphoric Acid.

"A liquid containing 66.3 percent. of hydrogen orthophosphate, H_3PO_4 , with 33.7 percent. of water. It may be prepared by treating with water and nitric acid, the residue left after burning phosphorus in the air." <Br. Sp. gr. 1.5.

ACIDUM PHOSPHORICUM DILUTUM. U. S., Br.

Diluted Phosphoric Acid.

The present U. S. P. directs that "Diluted Phosphoric Acid should contain 10 percent., by weight, of absolute Orthophosphoric Acid, [H_3PO_4 or $PO(OH)_3=97.29$], and 90 percent. water."

The formula given is

Phosphoric Acid, (85 percent.), 100 Gm. or 2 oz. av.

Distilled Water, to make, 850 Gm. or 17 oz. av.

Mix them. Keep the product in well-stoppered bottles.

This preparation contains 10 percent., by weight, of absolute orthophosphoric acid. Its sp. gr. is about 1.057 at 25°C. (77°F.).

Particular attention must be observed in making this preparation to know the standard of acid strength used, (85 percent.). If the 50 percent. phosphoric acid is used, 2 parts by weight of the acid with 8 parts by weight of water will be correct.

The Br. P. directs: "A liquid containing, by weight, 13.8 parts of hydrogen orthophosphate, H_3PO_4 , and 86.2 parts of water." Sp. gr. about 1.08.

Concentrated Phosphoric Acid, 3 fl.ounces (150 Cc.), 4.5 ounces, av. (225 Gm.), Distilled Water, a sufficient quantity.

Dilute the concentrated phosphoric acids, Br., with sufficient distilled water to form at 60°F. (15.5C.) 20 Imperial fl.ounces, or 1000 Cc. of diluted phosphoric acid. This preparation represents 10 percent. of phosphoric anhydride and is stronger than the U. S. preparation.

Dose.—5 to 20 minims.

The Ger. and Fr. standards have no preparation corresponding with the U. S. and Br.

Medicinal Uses. Diluted phosphoric acid is employed in medicine as a tonic, especially for the digestive organs. It is a good solvent for quinine salts.

Dose.—From 20 to 60 minims, (1.25 to 3.75 Cc.) largely diluted.

Acid Phosphate. Under this title a solution of calcium, magnesium, potassium and iron phosphates with excess of phosphoric acid has been extensively sold as a proprietary remedy. Formula will be found under solutions, **Liquor Acidi Phosphorici Comp.** and in the proprietary medicine formulas section.

ACIDUM PHOSPHOROSUM. Phosphorous Acid.

This is properly a hydrate of phosphorus oxide or anhydride, P_2O_3 . It is a dibasic acid, having one hydrogen atom not replacable by a metal base. It may be prepared for experiment by placing a moist stick of phosphorus in a small round bottle of which the bottom has been removed; invert the bottle in a glass funnel which is placed in a bottle containing a little water. The white vapor that is formed from the surface of the moist phosphorus falls through the funnel, and is absorbed by the water, making phosphorous acid much diluted.

Phosphites. Phosphorous acid, H_3PO_3 , combines with bases forming salts called **phosphites**, a few of which are in use in medicine.

ACIDUM PICRICUM. Picric Acid. Carbazotic Acid.

Trinitrophenol.

It occurs when indigo, silk, wool, leather, benzoin, aloes and other similar substances are acted upon by nitric acid; or it may be produced by adding coal-tar creosote to nitric acid and heating the mixture, when, after standing, crystals of picric acid will form. It is in pale yellow, shining lamellæ or prisms, and has a very bitter taste; it is soluble in alcohol and ether, but sparingly soluble in water.

It is extensively used in dyeing, giving a brilliant yellow color, and, combined with Prussian blue, many shades of green can be produced.

Picrates or **Carbazotates**, which are somewhat used in medicine are prepared by combining this acid with bases or radicals.

Caution. Picric acid forms explosive compounds with all readily oxidizable substances and with sulphur, phosphorus etc. Caution must therefore be observed in combining it with such substances or keeping it in close proximity to them, tannic acid, sugar etc. are particularly dangerous with it.

ACIDUM SALICYLICUM. U. S., Br. Salicylic Acid.

$HC_7H_5O_3=137.01$, U. S. $C_6H_4\cdot OH\cdot COOH$, Br.

From the year 1834, when salicylic aldehyde, (salicylous acid) was first discovered in the flowers of *spiræa ulmaria* until 1875, when Prof Kolbe perfected a process of obtaining it, which is now used,

salicylic acid was a rare and costly chemical. It is now known to be a constituent, in the form of methyl salicylate, of many of the essential oils, especially oils of wintergreen and sweet birch which contain about 90 percent. of the salt, methyl salicylate, ($\text{HC}_7\text{H}_5\text{O}_3$).

"An organic acid ($\text{HC}_7\text{H}_5\text{O}_3$) existing naturally in combination in various plants, but prepared synthetically, generally, from phenol." <U. S.

"A crystalline acid, $\text{C}_6\text{H}_4\cdot\text{OH}\cdot\text{COOH}$, obtained from natural salicylates such as oils of wintergreen and sweet birch, or by the interaction of sodium carbonate and carbonic anhydride." <Br.

Preparation. Salicylic acid may be prepared from oil of wintergreen or from salicin; but the expense is so great that the acids prepared from these substances is but little used. Synthetic salicylic acid, which is the acid of commerce, may be prepared by Kolbe's original process which was by evaporating a very concentrated solution of caustic soda with an equivalent quantity of carbolic acid (phenol) to a dry powder. This is then heated in a chamber retort to 100°C . (212°F .) and a current of dry carbon dioxide gas passed over it. The temperature is gradually increased to 180°C . (356°F .) then to 220°C . (482°F .) until phenol no longer passes over. In the retort, half the phenol that was used remains as sodium salicylate, while the other half has distilled over unchanged. The sodium salicylate contained in the retort is then dissolved in water; hydrochloric acid is added, which decomposes the sodium salt and the salicylic acid which floats on the surface is collected and washed on a filter until it is free from traces of hydrochloric acid. It is then dissolved in boiling water from which solution it is crystallized or purified by sublimation in a current of superheated steam.

A more recent process has been devised by R. Schmitt in which all the phenol instead of half is converted to salicylic acid. This is accomplished by acting upon dry sodium phenolate with a current of dry carbon dioxide at ordinary temperature so long as carbon dioxide is absorbed. The resulting phenyl-sodium carbonate is then heated for several hours to 140°C . in a closed vessel when by the interaction a molecular rearrangement takes place in which sodium salicylate is produced without the separation of one half the phenol as in Kolbe's process. The sodium salicylate is then decomposed and purified as in the above process.

Properties. Salicylic acid is soluble in about 308 parts of water or in 2 parts of alcohol at 25°C . (77°F .), and in 14 parts of boiling water. It is soluble also in 2 parts of ether and about 80 parts of chloroform. When carefully heated with glycerin it is soluble in about 50 parts, and a solution thus prepared mixes in all proportions with water. The acid melts at 15°C . (32.8°F .), and at a higher temperature gradually evaporates leaving not more than 0.6 percent. residue. The saturated

aqueous solution is colored intensely bluish-violet by ferric chloride test solution.

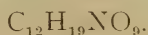
Uses. Salicylic acid is extensively used as a preservative to prevent change, decomposition and putrefaction, and the development of bacteria and vegetable organisms, although prohibitive pure food laws have been passed in many of the states against its use, it is a well recognized fact that the minute quantities used in any of the foods and drinks have never proven injurious to man, while by preserving these products in an unchanged condition and preventing the action of bacteria and ferments great benefits have been accomplished.

In medicine salicylic acid and its salts are used externally in the form of ointments, solutions, dressings, gauzes etc. Internally it is given as an antiseptic in fermentive diseases, and as a remedy for rheumatism and neuralgic affections. It is also the important ingredient in corn salves and solutions as it produces exfoliation of the callous.

Dose. In rheumatic affections and acute gout 5 to 15 grains of the acid may be given every four hours. The effect of the acid is generally more marked than of its salts, although it is probable that the acid is decomposed in the system.

Salicylates. This acid combines by interaction with carbonates and hydrates of the alkali metals, and with some other metallic and organic bases. Sodium salicylate is the best known of the salicylates.

ACIDUM SCLEROTINICUM. Sclerotic Acid.



This is a light-brown hygroscopic powder obtained from ergot, and represents the acid constituent of this drug. It dissolves in water and diluted alcohol but is insoluble in pure alcohol, ether and chloroform.

ACIDUM SOZOIODOLICUM. Soziodol.

Di-iodo-para-phenol-sulphuric Acid.

This is considerably used under the name Soziodol as an antiseptic in medicine and in pharmacy as an acid combining with bases; as mercury, potassium, sodium and zinc to form a series of antiseptic preparations now considerably used in medicine.

Composition. The acid consists of 52.8 percent. of iodine, 7 percent. of sulphur, and 20 percent. of phenol.

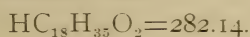
It is a white, brilliant, crystalline powder, having an acid taste and reaction and a strongly antiseptic action. The acid does not readily dissolve in ordinary menstrua, but the sodium salt, Sodium Soziodol, is easily soluble and should be used where aqueous solutions are employed. For external application it is usually mixed with talc or some non-irritant diluent, about 5 to 10 percent.

ACIDUM SOZOLICUM. (Aseptol).**Sozolic Acid. Orthophenolsulphonic Acid.**

This is official in the Roman and Ger. S. Ph. It is commonly known by its trade name, **Aseptol**.

Preparation. It is prepared by mixing cold phenol 1 part or 1 ounce av., pure sulphuric acid 1 part or 1 ounce av. Let stand in a glass vessel for one day and add sufficient dry barium carbonate to neutralize. Filter the liquid and concentrate by evaporation to sp. gr. 1.155. This contains $33\frac{1}{3}$ percent. of sozolic acid, and in this form it is miscible with water, alcohol or glycerin, and is used as an antiseptic wash for wounds, sores, ulcers etc.

Uses. It is used for the same purposes as carbolic acid but is not caustic nor irritant when well diluted to a 3 to 10 percent. solution. It has not been recommended for internal administration.

ACIDUM STEARICUM. U. S. Stearic Acid.

"A monobasic acid in its commercial, more or less impure form, usually obtained from the more solid fats, chiefly tallow." <U. S.

This acid was made official because of its use in making glycerin suppositories. It is a "hard, white, somewhat glossy solid, odorless and tasteless and permanent in the air. Insoluble in water, soluble in about 16.6 parts of alcohol at 25°C . (77°F .), readily soluble in boiling alcohol and ether." It melts at 69.2°C . (156.6°F .).

Dry stearic acid may be used in many preparations in place of spermaceti and white wax.

The chief use of this acid in pharmacy is for making glycerin suppositories; but in the arts stearin is used for making candles.

Candles were first made from stearin in 1825, by Chevreul and Braconnot, in France.

It is present to a considerable extent in soap in combination with oleic acid and margarin.

Stearates. Stearic acid combines with alkaline carbonates and hydrates forming soaps, which are properly stearates of metals with which the combination occurs.

ACIDUM SUCCINICUM. Succinic Acid. Sal Succini Volatile.

This substance was observed by Agricola in 1550 and was recognized as an acid by Lemery in 1675. It is found in certain plants and is formed in the oxidation of wax, spermaceti and some other fatty organic substances. It occurs in the vinous fermentation of sugar and the fermentive action of casein in combination with tartrates and malates. It is official in the It., Sp., Nor and Swed. pharmacopœias.

Preparation. It is prepared commercially by the dry distillation of amber which is coarsely powdered and placed in a glass retort entirely covered with sand, the retort having a short neck connected with a large receiver and heat applied to about 280°C . (536°F .), and this temperature continued so long as vapors rise. The succinic acid crystallizes in the neck of the retort, while oil of amber and water containing acetic and succinic acids are found in the receiver.

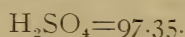
Properties. The crystalline acid obtained has the odor of oil of amber, but may be purified by recrystallization from its aqueous solution and becomes odorless. It dissolves in 2.2 parts of boiling water or 28 parts of cold water, and is freely soluble in alcohol or ether.

Uses and Dose. The acid has been used for rheumatism, bronchitis and nervous affections, especially as an anti-spasmodic, but its salts are more generally employed. It may be given in doses of from 5 to 15 grains. (0.33 to 1 Gm.).

Succinates. This acid forms salts with the alkalies which are readily soluble in water, ammonium succinate being the best known of its compounds.

Oxy-Succinic or Malic Acid. This acid is the chief acid constituent of many kinds of fruits and berries. It is the sour principle of apples, from which it may be obtained by evaporating the juice and crystallizing and purifying. It forms salts with bases, which are called malates.

ACIDUM SULPHURICUM. U. S., Br. Sulphuric Acid.



"A liquid composed of not less than 92.5 percent., by weight, of absolute Sulphuric Acid (H_2SO_4), and 7.5 percent. of water." <U. S. Sp. gr. about 1.826 at 25°C . (77°F .), boils at 338°C . (640°F .).

"An acid produced by the combustion of sulphur or pyrites, and the oxidation and hydration of the resulting sulphurous anhydride by means of nitrous and aqueous vapors. It should contain about 98 percent., by weight, of hydrogen sulphate, H_2SO_4 ." <Br. Sp. gr. 1.843.

This acid is said to have been mentioned in the works of Rhasés, an alchemist and physician of the 10th century, but its discovery is generally attributed to Basil Valentine in the 15th century.

The acid percentage of C. P. sulphuric acid is nearly the same in all pharmacopœias, the U. S. having less percentage and less sp. gr. than any other authority.

Uses. In pharmacy sulphuric acid is used in making aromatic sulphuric acid and diluted sulphuric acid, also for making many of the chemical salts. It was formerly much used for making gas for "charging" soda water, but the manufacturers now furnish liquid carbonic acid gas in cylinders for that purpose. As a solvent for al-

kaloids, sulphuric acid is extensively used by manufacturing chemists in exhausting drugs. It is used much diluted for this purpose.

In medicine it is employed as a tonic and absorbent of gases generated in the stomach. It should be given in very small doses, much diluted with water. As a rule druggists should only use diluted sulphuric acid in prescriptions or compounds, thus avoiding serious effects if the strong acid should accidentally be used. As a caustic sulphuric acid is frequently applied to chancres, ulcers etc., and to warts and other fungi. In the arts this acid is very extensively used.

Sulphates. Sulphuric acid combines with nearly all basic substances, forming Sulphates, which are most abundant and among the most important of the chemical salts. These salts are extensively used in the arts and in medicine. Manufacturing chemists employ sulphuric acid more extensively than any other in the making of salts from the metals and organic bases.

Acidum Sulphuricum Crudum. This is the ordinary sulphuric acid of commerce, extensively used for manufacturing chemicals and for other purposes in the arts and industries. It is official in most of the European pharmacopœias, its acid strength being from 91 to 95%.

Nordhausen Sulphuric Acid is so named from the place in Saxony where it is manufactured. This is a semi-solid concentrated acid usually put up in sealed glass flasks, and is otherwise known as "Fuming Sulphuric Acid." It is extensively used in manufacturing Alizarin and some other chemical compounds.

ACIDUM SULPHURICUM ALCOHOLISATUM.

Haller's Elixir. Haller's Acid Drops.

This preparation is official under different classifications in most of the European pharmacopœias, and is of essentially the same composition in all, although the formulas differ considerably owing to the difference in the official percentage of sulphuric acid in the different countries. It is employed in medicine as an astringent and diuretic, the dose being from 6 to 12 minims in water.

Sulphuric Acid, by weight, 1 part or 1 ounce av.

Alcohol, by weight, 3 parts or 3 ounces av.

Mix them very gradually by adding the acid in small portions to the alcohol contained in a bottle. It should be kept in glass-stoppered bottles.

ACIDUM SULPHURICUM AROMATICUM. U. S., Br.

Aromatic Sulphuric Acid. Elixir of Vitrol.

"Aromatic Sulphuric Acid should contain not less than 20 percent., by weight, of absolute Sulphuric Acid, partly in the form of Ethyl-Sulphuric Acid." < U. S.

The U. S. formula is:

Sulphuric Acid,	111 Cc. or 111 minims
Tincture of Ginger,	50 Cc. or 50 minims
Oil of Cinnamon,	1 Cc. or 1 minim
Alcohol, sufficient to make	1000 Cc. or 1000 minims

Add the sulphuric acid gradually and with great caution to 700 Cc. (700 minims) of alcohol and allow the mixture to cool. Then add to it the tincture of ginger and oil of cinnamon, and afterwards enough alcohol to make the whole measure 1000 Cc. (or 1000 minims). Sp. gr. about 0.933 at 25°C. (77°F.). Aromatic sulphuric acid contains about 20 percent., by weight, of official sulphuric acid, partly in the form of ethyl-sulphuric acid.

The Br. P. formula is:

Tincture of Ginger,	250 Cc. or 10 fl.ounces
Spirit of Cinnamon,	12.5 Cc. or ½ fl.ounce
Alcohol, (90%),	737.5 Cc. or 29½ fl.ounces
Sulphuric Acid,	75 Cc. or 3 fl.ounces
	(or 138.2 Gm.) (or 2419 grains).

Mix the sulphuric acid gradually with the alcohol, add the spirit of cinnamon and tincture of ginger. Sp. gr. 0.922. Dose 5 to 20 minims.

Medicinal Uses. Aromatic sulphuric acid, which is more commonly known as elixir of vitrol, is more frequently used and prescribed than any of the other dilute acid preparations. It is given as a tonic, particularly for night sweats and for catarrhal conditions or lack of tone of the intestinal canal and stomach. The dose is 10 to 30 minims (0.6 to 2 Cc.) in water, three times a day.

ACIDUM SULPHURICUM DILUTUM. U. S., Br.

Diluted Sulphuric Acid.

"Diluted Sulphuric Acid should contain not less than 10 percent., by weight., of absolute sulphuric acid and about 90 percent. of water."
<U. S.

The U. S. formula is:

Sulphuric Acid,	100 Gm. or 2 ounces av.
Distilled Water,	825 Gm. or 16½ ounces av.
To make	925 Gm. or 18½ ounces av.

The Br. P. formula directs that:

"100 parts by weight should contain 13.65 percent. of hydrogen sulphate."

Sulphuric acid 82.7 Cc. [or 1 fl.ounce and 5¼ fl.drachms, (more exactly, 1.65 fl.ounces, or 1333 grains)]; distilled water to make 1000 Cc. (or 20 fl.ounces).

Sp. gr. 1.094. Dose, 5 to 20 minims.

Medicinal Uses. Sulphuric acid is considerably used as a tonic and astringent, also as an antiseptic. It clears the mucous membrane of

the alimentary canal, thus promoting glandular action, and is employed to advantage in catarrhal conditions of the stomach and intestines, diarrhœa etc.

As it readily dissolves quinine salts it is frequently used in solutions containing them and also with many alkaloidal salts in which an acid is required for their solution. Dose, from 10 to 30 minims (0.6 to 2 Cc.) three times a day in sweetened water or lemonade.

ACIDUM SULPHUROSUM. U. S., Br. Sulphurous Acid.

"A liquid compound of not less than 6.4 percent., by weight, of Sulphurous Acid Gas (sulphur dioxide, SO_2), and not more than 93.6 percent. of water." <U. S. Sp. gr. not less than 1.035 at N. T.

"An aqueous solution containing 6.4 percent. of hydrogen sulphite, H_2SO_3 , corresponding to 5 percent., by weight, of sulphurous anhydride, SO_2 . The sulphurous anhydride may be prepared by burning sulphur in air or oxygen, or by boiling sulphuric acid with carbon, mercury or copper." <Br. 1898.

The U. S. process which is the only one now official is as follows:

Sulphuric Acid,	80 Cc. or 8 fl.ounces
Charcoal, in coarse powder,	20 Gm. or 2 ounces av.
Distilled Water,	1000 Cc. or 100 fl.ounces

Introduce the charcoal into a glass flask having a capacity of about 500 Cc. (or one pint), add the acid and mix them well. By means of a glass tube and well fitting corks connect the flask with a wash-bottle of the capacity of about 200 Cc. (or half a pint) which is one-third filled with water and fitted with a cork having three perforations. Into one of these perforations insert a safety tube which should reach nearly to the bottom of the bottle; into the remaining perforation fit a glass tube, and connect it with a bottle having a capacity of about 1500 Cc. (or 3 pints) containing 1000 Cc. (or 2 pints) of distilled water deprived of air by being boiled shortly before use. The tube should dip about twenty-five millimeters below the surface of the distilled water. By means of a second tube connect this bottle with another containing a dilute solution of sodium carbonate, to absorb any gas which may not be retained by the distilled water. Having ascertained that all connections are air tight, apply a moderate heat to the flask containing the sulphuric acid and charcoal, until the evolution of gas has nearly ceased, and, during the passage of the gas, keep the bottle containing the distilled water at or below 10°C . (50°F .), by surrounding it with cold water or ice. Finally pour the sulphurous acid into dark amber-colored, glass-stoppered bottles, and keep them in a cool place, protected from light.

This acid is usually supplied by manufacturing chemists and is but little used in pharmacy or medicine.

The gaseous acid is condensed to a liquid by suitable apparatus.

This is known as Liquified Sulphurous Acid Gas and is used in ice making machines for producing ice. It is also extensively employed in the arts for bleaching; in the manufacture of paper pulp; and in sanitation as a disinfectant for contagious and infectious diseases.

Medicinal Uses. The official acid is employed as a germicide and efficient antiseptic. It may be sprinkled about rooms, or in diluted solution with 3 parts of water may be used externally for parasites, skin diseases, lice and other vermin. It is sometimes used by inhalation for diphtheria, membranous croup, catarrh etc., but great caution must be observed in its use. Internally it is given in very minute doses as an antiseptic and antipyretic; but it must be very cautiously administered in very dilute solution.

Sulphites. Sulphurous acid gas (sulphur dioxide, SO_2) interacts with solutions of some of the alkaline carbonates, disengaging carbon dioxide, and taking its place in the salt. The resultant preparation is a sulphite or bisulphite of the metal. When the current of sulphurous acid gas is passed through a solution say of sodium carbonate until it is completely saturated, a bisulphite or acid sodium sulphite results. The neutral sulphite may be prepared from this by adding a quantity of sodium carbonate the same as was first taken.

ACIDUM TANNICUM. U. S., Br. Tannic Acid.

(Tannin).



"An organic acid obtained from nut-galls." <U. S.

"Tannic acid, $\text{C}_{14}\text{H}_{10}\text{O}_9 \cdot 2\text{H}_2\text{O}$, may be extracted by water-saturated ether from galls which have been subjected to a special fermentation." <Br. 1898.

Preparation. The following formula for making this acid was official in the Br. P. 1885:

Galls in powder,

Ether,

of each a sufficient quantity.

Expose the powdered galls to a damp atmosphere for two or three days, and afterwards add sufficient ether to form a soft paste. Let this stand in a well-closed vessel for 24 hours; then, having quickly enveloped in a linen cloth, submit it to a strong pressure in a suitable press, so as to separate the liquid portion. Reduce the pressed cake to a powder, mix it with sufficient ether to which one-sixteenth of its bulk of water has been added, to form again a soft paste, and press as before. Mix the expressed liquids and expose the mixture to spontaneous evaporation until, by the aid, subsequently, of a little heat it has acquired the consistence of a soft extract; then place it on earthen plates or dishes and dry it in a hot-air chamber at a temperature not exceeding 212°F . (100°C). <Br. 1885.

In making this acid commercially, the process is considerably dif-

ferent, a much greater yield being obtained, but lacking the purity of acid obtained by the above formula.

Properties. Tannic acid is soluble in about one part of water or 0.6 part of alcohol at N. T. With the aid of heat it dissolves in about one part of glycerin, but is insoluble in absolute alcohol, ether, chloroform or benzin. The solution of tannin in water forms precipitates (tannates) with most alkaloids and bitter principles of drugs and with solutions of gelatin, albumen and starch.

Uses. In the arts tannin in the form of extracts from barks, leaves, seeds, fruit or roots, is extensively used for tanning leather. In manufacturing chemicals it is much used in various manipulations.

In medicine tannin is used as an astringent both internally and externally, and is a common ingredient of suppositories, injections, washes, ointments etc.

Tannates Tannic acid combines with some of the metals and with many of the alkaloids forming salts known as tannates which are considerably used in medicine. The combination with metallic bases is usually effected by interaction of some metallic salt with tannin in solution, while with alkaloids the action may be direct between solutions of the alkaloids and tannin.

Gallotannic Acid. Another name for tannic acid or tannin.

ACIDUM TARTARICUM. U. S., Br. Tartaric Acid.

$\text{H}_2\text{C}_4\text{H}_4\text{O}_6 = 149.64$, U. S. $\text{C}_4\text{H}_6\text{O}_6$, Br.

"An organic acid usually prepared from argols." <U. S.

"Tartaric acid or dextro-rotary hydrogen tartrate, $\text{C}_4\text{H}_6\text{O}_6$, prepared from acid potassium tartrate. In constitution it may be regarded as dioxysuccinic acid or dihydroxysuccinic acid.

$\text{CH}\cdot\text{OH}\cdot\text{COOH}$.

$\text{CH}\cdot\text{OH}\cdot\text{COOH}$." <Br. 1898.

Preparation. The present U. S. and Br. P. give no formula for making this acid. The Br. P. formula of 1885 was as follows:

Acid Tartrate of Potassium,	45 ounces av.
Distilled Water, a sufficiency.	
Prepared Chalk,	12½ ounces av.
Chloride of Calcium,	13½ ounces av.
Sulphuric Acid,	13 fl.ounces

"Boil the acid tartrate of potassium with two gallons (Imperial measure) of the water, and add gradually the chalk, constantly stirring. When the effervescence has ceased add the chloride of calcium dissolved in 40 Imperial fl.ounces of water. When the tartrate of calcium has subsided pour off the liquid and wash the tartrate with distilled water until it is rendered tasteless. Pour the sulphuric acid first diluted with 60 Imperial fl.ounces of water upon the tartrate of calcium. Mix thoroughly, boil for half an hour, with repeated stir-

rings, and filter through calico. Evaporate the filtrate at a low temperature until it acquires the sp. gr. of 1.21, allow to cool, then separate and reject the crystals of sulphate of potassium which have formed. Again evaporate the clear liquor until a film appears on the surface and allow it to cool and crystallize. Lastly purify the crystals by solution, filtration, (if necessary) and recrystallization." <Br.

Tartaric acid was first isolated by Scheele in 1770. The commercial process for preparing this acid is somewhat different, and it is seldom prepared except by manufacturing chemists.

Properties. Tartaric acid is rarely found in drug stores except in the form of powder, which is quite apt to mass and form into lumps. It may, however, be readily reduced to powder again in a mortar. It is soluble in about 0.8 part of cold or 0.5 part of boiling water, in about 2.5 parts of alcohol. It melts at 135°C . (275°F .), and at a higher temperature it is decomposed having an odor of burning sugar, and is finally consumed, leaving no more than 0.05 percent. of ash. It is a mistake to put this acid into glass jars, as it adheres to the sides and masses, making it hard to get out, while if kept in paper boxes, or even in a tough paper sack or a wooden drawer, it loses somewhat of its water of crystallization and becomes dry rather than damp as it does when kept in glass.

To neutralize 3.75 Gm. of tartaric acid should require 50 Cc. of potassium hydrate test solution, (each Cc. corresponding to 2 percent. of the pure acid), phenolphthalein being used as an indicator. This test is often required as this acid is often an ingredient of baking powders. A solution of this acid is often used at the soda fountain for making "acid phosphate," lemon or orange phosphate.

Tartaric acid has many properties in common with sugar, allusion being made to them in the description of this acid in the Br. P., that is, its property of turning polarized light to the right or left.

This acid exists in five forms as follows:

Dextro-tartaric acid, which is the commonly known tartaric acid; a solution of this acid in water turns the plane of polarization to the right.

Dioxysuccinic Acid. The chemical name for tartaric acid.

Lævo-tartaric acid, its solution in water turning the plane of polarization to the left.

Racemic or para-tartaric acid, which has no effect on polarized light.

Meso-tartaric acid, which is also inactive.

Meta-tartaric acid, by fusing ordinary tartaric acid.

The first form only is generally found and known in commerce.

Uses. As an ingredient of baking powder this acid is extensively used in combination with some alkaline carbonate or bicarbonate.

In the making of effervescent salts, which are popular forms of medication, it is much used. In solution it is used as a fruit acid for

acidulating soda water syrups and in squirt bottles to make "phosphates drinks." It is also used considerably in making artificial lemonade, and in medicine for making effervescing and refrigerating drinks.

The dose is from 5 to 10 grains. (0.32 to 2 Gms.).

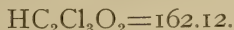
Tartrates. Tartaric acid combines with the bases of alkaline carbonates, and with many other metallic carbonates and with alkaloids and some of their salts forming **normal tartrates**, and with some bases, **bitartrates** which are known as **acid tartrates**.

The tartrates are generally quite soluble. When neutral potassium salts in solution are added to a solution of tartaric acid, a crystalline precipitate of acid potassium tartrate is formed. This property of tartaric acid is of considerable value in separating hypophosphorous, hydrobromic and iodic acids from their combinations with potassium salts.

ACIDUM THIOSULPHURICUM. Thiosulphuric Acid.

This acid to which is given the formula $\text{H}_2\text{S}_2\text{O}_3$, is known only in its combinations and is the first member of a series called the "Thionic Series." It differs from sulphuric acid by the replacement of one oxygen atom by one sulphur atom. It is improperly called "hydrosulphuric acid." The other members of the series are dithionic acid, $\text{H}_2\text{S}_2\text{O}_6$; trithionic acid, $\text{H}_2\text{S}_3\text{O}_6$; and pentathionic acid, $\text{H}_2\text{S}_5\text{O}_6$. These acids form combinations with various bases, forming thionic salts which are now frequently noticed.

ACIDUM TRICHLORACETICUM. U. S. Trichloroacetic Acid.



"A monobasic organic acid [$\text{CCl}_3\cdot\text{COOH}$], usually obtained by the oxidation of hydrated chloral with nitric acid." <U. S.

Properties. It is in white deliquescent crystals, very soluble in water, alcohol and ether. Upon boiling its aqueous solution it is decomposed into chloroform and carbon dioxide. At 52°C . (125°F .) it melts and at 195°C . (383°F .) it boils and vaporizes without leaving a residue.

Uses. Like the other chloroacetic acids it is caustic, and is chiefly used for the removal of warts or morbid growths and in solution for the treatment of diseased gums or papilloma. It must be carefully used in interior cavities.

Dose internally, from 3 to 10 grains. (0.20 to 0.679 Cc.).

ACIDUM VALERICUM. Valeric Acid.

[Valerianic Acid].



This acid may be prepared from valerian root according to the Fr. Codex official formula, or from amyl alcohol, by oxidation with

sulphuric acid and potassium bichromate, as directed in the Ital. Farm. The product of the Ital. Farm. is **Amylic Acid**, which is identical with valerianic (valeric) acid.

Properties. When purified by distillation valerianic acid is a colorless liquid having the peculiar odor of valerian. It dissolves in 30 times its weight of water and in all proportions in alcohol and ether. It boils at 175°C. Its sp. gr. at 0°C. is 0.955.

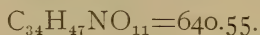
Valerianates or Valerates. A considerable number of valerianates (valerates) are prepared and used in medicine. They all have the characteristic odor of valerian, and therapeutic action similar to valerian. Nervine and antispasmodic.

In the U. S. P. the two salts now official—ammonium and zinc—are called **Valerates** and manufacturing chemists in this country now label and list all salts of valerianic or valeric acid as **Valerates**.

Other Acids.

The foregoing acids include all that are officially recognized in the pharmacopœias. There are, however, a large number of organic acids, and many inorganic acids, and compound acids, not described in this section but mentioned under the titles of the substances from which they are obtained or derived, or by other titles throughout this work. The index refers to the pages on which they may be found.

ACONITINA. U. S., Br. Aconitine.



"An alkaloid obtained from Aconite. It should be kept in amber-colored, well-stoppered vials." < U. S.

"An alkaloid obtained from aconite root, and having the formula $\text{C}_{33}\text{H}_{45}\text{NO}_{12}$." < Br.

Aconitine is present in aconite, associated with several other alkaloids, as **pseud-aconitine**, $\text{C}_{36}\text{H}_{49}\text{NO}_{12}$; **picraconitine**, $\text{C}_{31}\text{H}_{45}\text{NO}_{10}$; **aconine**, $\text{C}_{26}\text{H}_{41}\text{NO}_{11}$; **pseud-aconine**, $\text{C}_{36}\text{H}_{49}\text{NO}_{12}$; **aconitic acid**, $\text{H}_3\text{C}_6\text{H}_8\text{O}_6$ etc.

Owing to the many varieties of aconite root of commerce which yield different alkaloids, any general formula which would apply to all would be uncertain in its results, as different varieties of aconite yield different alkaloids. This alkaloid is therefore, chiefly manufactured by a few manufacturing chemists who have made a reputation for their particular make. The **crystallized aconitine**, made by the French chemist Duquesnal, stands the highest, but the most that is found in the market is amorphous, and is supplied by other chemical establishments of good repute.

The following process for making crystallized aconitine was proposed by John Williams, F. C. S., at the August, 1880, meeting of the Br. Pharmaceutical Council. The root of *Aconitum Napellus* only should be used:

The root should be brought to the state of a coarse powder only; if made very fine it is difficult to work. It should be exhausted with spirit of full strength (rectified spirit), say 62 to 64 per cent., about four ounces of tartaric acid to each cwt. of the root should be dissolved in the spirit; cold maceration for about four days, followed by percolation, returning the percolate to the root for the second maceration for a day, then percolating until the drug is exhausted and a very concentrated tincture is obtained. The spirit must now be distilled off at the lowest possible temperature, but the distillation should be stopped and a little hot water added before all the spirit has passed over. The evaporation by water-bath is then to be continued by gentle heat until all traces of the spirit have been driven off. The thin aqueous extract is then to be filtered through coarse wetted filter paper, which separates the resinous and a portion of the oily matter; the remainder of the oily matter is then removed by shaking with ether, the ether is separated and to the remaining purified aqueous extract a slight excess of concentrated solution of carbonate of sodium (sal soda) is added, which precipitates the alkaloid; this is heated and the alkaloids separated into a mass, which is to be washed on a filter with hot water, then dried and macerated in several portions of pure ether. The other washings are then to be mixed, filtered and allowed to evaporate spontaneously. Crystals of aconitine may then be collected, drained and dried.

The U. S. P. preparation as described is essentially the same as would be made by this formula. It is soluble at 25°C. (77°F.) in 3200 parts of water, 22 parts of alcohol, 44 parts of ether, 56 parts of benzene; very soluble in chloroform.

Aconitine has been used externally in the form of an ointment and oleate; the former is official in the Br. P. (see Ointments), and the latter is supplied by manufacturing chemists. (See Oleates). On account of its great power and the uncertainty of the preparation on the market, it has been but little used internally; but as more reliable and uniform aconitine is now being produced, it is more employed. It is generally used in the form of a triturate, one part with 500 parts sugar of milk. The dose of aconitine is from $\frac{1}{500}$ to $\frac{1}{250}$ of a grain, hence the dose of a triturate 1 : 500 is from 1 to 2 grains. It is used for the same purpose as aconite in fever, neuralgia etc.

Average dose.—U. S., 0.00015 Gm.=0.15 milligramme, ($\frac{1}{400}$ grain).

Aconitinum Nitricum. Aconitine Nitrate, $C_{33}H_{43}NO_{12}, HNO_3$. This may be prepared by dissolving aconitine in diluted nitric acid just sufficient to effect solution, then evaporating and crystallizing; or by exhausting aconite root with alcohol, as directed for making aconitine, distilling off the alcohol, adding boiling water and a slight excess of ammonia water, filtering, dissolving the filtrate in water acidulated with nitric acid, evaporating and crystallizing. Aconitine

sulphate and other salts of aconitine may be prepared in the same manner as the nitrate by using corresponding acids. The salts are readily soluble and possess the same properties as the alkaloid; 100 parts contain 91.10 aconitine. The dose, when administered internally, is from $\frac{1}{300}$ to $\frac{1}{200}$ grain.

ACONITUM. U. S. Aconite.

"The dried tuberous root of *Aconitum Napellus*, Linné (Fam. Ranunculaceæ), collected in autumn; yielding, when assayed by the process given, not less than 0.5 percent. of aconitine." <U. S.

(See Part I, page 118, and assay process in U. S. P.).

ACRYL.

The hypothetical radical, C_2H_2O , of acrolein and like substances.

Acrolein. C_3H_4 . A volatile, colorless liquid, with pungent taste and irritating vapor, obtained by destructive distillation of fats, or by dehydrating glycerin.

Acrylic Acid. C_4H_4O . A colorless compound made by the oxidation of acrolein.

ADEPS. Lard.

"The prepared internal fat of the abdomen of the hog, purified by washing with water, melting and straining. It should be kept in well-closed vessels impervious to fat, in a cool place." <U. S.

"The purified fat of hogs, *sus scrofa*, Linn." <Br. The title *Adeps Præparatus*, Prepared Lard, has formerly been official in the Br. P., but is changed in the last revision to *Adeps*, Lard.

The name lard is applied commercially to the rendered fat of the hog; but in pharmacy the term is intended only to apply to lard purified by washing with water, melting and straining. The process described in the present Br. P. is as follows:

Preparation. "From the perfectly fresh fat of the abdomen of the hog remove as much of the external membranes as possible. Suspend the fat so that it shall be freely exposed to the air for some hours; cut into small pieces; reduce these to a uniform mass in which the membrane vesicles are completely broken, by beating in a mortar or by some similar process; put the mass thus produced into a vessel surrounded by warm water; heat to a temperature not exceeding $135^{\circ}F.$ ($57.2^{\circ}C.$) until the fat has melted and separated from the membranous matter; strain."

It will be observed that the British process avoids the use of a high degree of heat and will thus produce a lard of softer consistency than that made by rendering with steam as is usual with lard obtained in commerce, as the latter would contain a greater percentage of stearin and the more solid fats.

In this country lard is generally prepared for use in pharmacy (if it is prepared at all) by washing it on a stone slab, allowing a stream of

water to trickle over it and working it with a wooden spatula or muller until free from odor or impurities. It is then melted and strained, and is known as **prepared** or **washed lard**.

The following method of washing lard which was first published in Fenner's Complete Formulary is recommended as being more convenient and as producing better results than washing on a slab.

Melt the lard and pour it into any convenient bottle that has three times the capacity of the lard to be washed. While the lard is still melted fill the bottle nearly full of hot water and while the mixture is cooling, agitate it frequently; by this means the lard is granulated or reduced to small fragments and is thoroughly washed, as it cools. When cold, pour off the water and add fresh cold water to the granulated lard; agitate as before, pour off the water and repeat the washings in this manner until the lard is thoroughly washed and is free from odor. The lard may then be melted in the bottle by surrounding it with hot water or otherwise and strained into earthen-ware jars. By adding a fluid drachm of tincture of benzoin to each pound of the lard when melted in the bottle, and macerating for an hour or two it will keep almost indefinitely without becoming rancid and may appropriately be used as Benzoinated Lard.

Properties and Uses. Lard is insoluble in alcohol, entirely soluble in ether, chloroform, carbon disulphide, and benzin. Sp. gr. about 0.917 at 25°C. (77°F.). Melts at 100.4°F. [100°F. (37.8°C.) Br.]. When melted it unites readily with wax and paraffin, which should themselves be melted. It consists of **olein**, which is commercially known as **lard oil**, **stearin**, which is chiefly used in making candles, and **palmitin**.

In pharmacy, lard as described in the pharmacopœias, prepared or washed should be used for making benzoinated lard, simple cerate, simple ointments and other cerates and ointments, and should be dispensed when lard is directed to be used. It is unfortunate, however, that only a small proportion of the present day druggists keep the prepared or washed lard on hand, the great majority of pharmacists using in its place ordinary butcher's lard, which soon becomes rancid.

Besides its uses in medicinal preparations, washed or prepared lard is extensively used in Continental Europe for absorbing the odor of flowers used in making perfumes. (See Perfumes).

ADEPS BENZOINATUS. U. S. Benzoinated Lard.

Adeps Benzoatus. Br. Benzoated Lard.

The U. S. formula is:

"Lard,	1000 grammes or	1 pound av.
Benzoin, coarse powder,	20 grammes or	140 grains

"Add the benzoin to the lard and mix thoroughly; then melt the lard by means of a water-bath, and, stirring frequently continue the

heat for two hours, covering the vessel and not allowing the temperature to rise above 60°C. (140°F.). Lastly strain the liquid through muslin and stir occasionally while it cools. When benzoinated lard is to be used during warm weather, 5 percent. (or more if necessary) of the lard should be replaced by white wax." <U. S.

The formulas of other pharmacopœias except the Br. correspond in quantity with the U. S.

The Br. formula for **Adeps Benzoatus, Benzoated Lard** is:

Lard,	500 grammes or 1 pound av.
Benzoin, in powder,	15 grammes or 210 grains

"Melt the lard on a water-bath, add the benzoin; continue the application of heat for two hours, frequently stirring; remove the residue of the benzoin by straining; stir the Benzoated Lard until cold." <Br. 1898.

It will be observed that the proportion of benzoin used is 50 percent. more than in the U. S. formula and that the temperature is not limited as in that of the U. S. While the additional quantity of benzoin used is probably of advantage, it is questionable if the degree of heat should not be restricted not to exceed 70°C. (158°F.).

Uses. Benzoinated lard is now quite generally used as the basis of the official ointments, and is prescribed as a vehicle for the external application of many medicaments. When properly prepared it will keep indefinitely and retains the balsamic odor of the benzoin.

ADEPS LANÆ. U. S., Br. Wool Fat.

"The purified fat of the wool of sheep (*Ovis Aries* Linné) freed from water." <U. S.

"The purified cholesterine-fat of sheeps' wool." <Br.

Wool fat (without water) is described in the Br. P. as "a yellowish, tenacious, unctuous substance; almost inodorous; melting point varies from 104° to 144°F. (40° to 44.4°C.) readily soluble in chloroform or ether, sparingly soluble in alcohol (90 percent.) etc." The wool fat found in the market usually contains considerable water and is given the official name "*Adeps Lanæ Hydrosus*." It is seldom, however, prescribed by this name, most physicians writing *Adeps Lanæ* or *Lanolin* when the hydrous wool fat is designed to be used.

ADEPS LANÆ HYDROSUS. U. S., Br.

Hydrous Wool Fat.

"The purified fat of the wool of sheep (*Ovis Aries* Linné) mixed with not more than 30 percent. of water." <U. S.

The Br. P. directs this preparation to be prepared from *Adeps Lanæ* as follows:

Wool Fat,	140 Gm. or 7 ounces
Distilled Water,	60 Cc. or 3 fl.ounces

Place the wool fat in a warm mortar; add the distilled water gradually and with constant trituration. < Br.

Yellowish white; free from rancid odor. When heated, it separates into an upper oily and a lower aqueous layer.

The P. G. Directs

Anhydrous Wool Fat,

75 parts

Water,

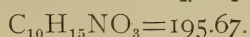
25 parts

to be mixed in the same manner as is described under the Br. formula.

Lanolin, as this ointment base is more generally known in this country, has the property of retaining a considerable percentage of water, making it useful as an ointment base when it is desirable to use salts soluble in water for external application. It is obtained from the washings of wool by a patented process invented by Leibreich. The fat is separated from the washings, treated, cleaned, purified and rendered neutral by several complicated processes, producing finally the preparation found upon the market as *Adeps Lanæ*, *Oleum Lanæ*, *Lanolin*, *Aginine* and by several other names that have been given it by different manufacturers. It is an ointment base, emmolient and skin food.

It is used chiefly in ointments in which the medicaments with which it is combined are to act by being absorbed through the skin. It takes up twice its weight of water without losing its ointment consistence.

ADRENALIN. Epinephrine.



This active principle of the suprarenal glands of animals was first isolated by the Japanese chemist Takamine, and introduced to the trade by Parke, Davis & Co. Since its introduction similar preparations under other trade names have been produced by many other chemical houses. *Adrin*, *Adnephryn*, *Adrenal*, *Adrenamine*, *Caprenalin*, *Epinephryn*, *Hemisine*, *Hemostatin*, *Paranephryn*, *Suprarenaline*, *Suprarenin*, are names by which this principle is marketed by various concerns. It is, chemically, dihydroxymethylaminoethylbenzene, $\text{C}_6\text{H}_3(\text{OH})_2(\text{CHOH}, \text{CH}_2\text{NHCH}_3)$, a feebly basic, crystalline, white substance of bitter taste, but little soluble in water and readily oxidized in presence of air or organic substances.

For this reason its soluble hydrochloride is generally supplied to physicians in normal salt solution 1:1000, preserved with $\frac{1}{2}$ percent. chlore-tone. It is administered generally by subcutaneous or intravenous injection, but may be applied locally. It is a vaso-constrictor and hemostatic of great power. Locally its solution is used in ophthalmic and laryngial operations preventing the flow of blood. The dose of the solution as above is from 5 to 30 minims, (0.3 to 2 Cc.). The crystalline principle is also administered in the form of an oleate

1:1000 or dissolved in oil, as a spray for mucous surfaces, to be used with a nebulizer, and in the form of ointment.

ÆTHERES — ETHERS.

Ethers are volatile liquids, which, from their property of rapid evaporation have derived their name Ether (air). They are chemically oxides of alcohol radicals, made by mixing acids with alcohols etc., and distilling over the lighter portions. They are mostly inflammable, and of low specific gravity.

The name Ether is applied in pharmacy only to the variety known commercially as sulphuric ether, and chemically as ethyl oxide; other ethers are known commercially by the names of the acids with which the alcohol radical is combined, as acetic ether, nitrous ether, or chemically by the names of the acid and alcohol radical, as amyl acetate, ethyl nitrite etc. Some substances are termed ethers which are not properly so classed, as petroleum ethers, while others which are properly ethers do not bear the name, as amyl nitrite etc.

Ethers require conveniences for making not generally at hand except in chemical laboratories, and are therefore usually supplied by manufacturing chemists.

The ethers chiefly used in pharmacy are derived from the amyl and ethyl alcohols. The amyl ethers are mainly used for making artificial fruit and liquor flavors; and the ethyl ethers are chiefly used in medicine. Besides these, ethers are made from methyl, propyl, butyl, caproyl and some other alcohol radicals. They are chiefly used in making artificial fruit flavors. Nearly all acids may be combined with these alcohols to form ethers, the combination being the same chemically as when acids unite with other bases to form salts, except that the ethers are always gaseous or liquid, and are separated by distillation.

Under this heading will be considered the preparations which are official in the pharmacopœias or well known commercially as ethers, and a few etherial preparations not otherwise classified; other etherial preparations will be mentioned under the headings in which they properly belong.

Ethyl Ethers. Various acids combine with ordinary (ethyl) alcohol ($C_2H_5.OH$) to form a variety of ethers. Several of these are used in medicine and in making medicinal preparations; while some of them are used to prepare artificial fruit and liquor flavors. The following list includes most of the ethyl ethers that are used. They are known commercially as ethers:

Ethyl Acetate,	$C_2H_5.C_2H_3O_2$	Acetic Ether.
Ethyl Benzoate,	$C_2H_5.C_7H_5O$	Benzoic Ether.
Ethyl Bromide,	$C_2H_5.Br$	Hydrobromic Ether.
Ethyl Butyrate,	$C_2H_5.C_4H_7O_2$	Butyric Ether.
Ethyl Formate,	$C_2H_5.CHO_2$	Formic Ether.
Ethyl Iodide,	$C_2H_5.I$	Hydriodic Ether.
Ethyl Chloride,	$C_2H_5.Cl$	Hydrochloric Ether.

Ethyl Nitrite,	$C_2H_5NO_2$	Nitrous Ether.
Ethyl Oxide,	$(C_2H_5)_2O$	Sulphuric Ether.
Ethyl Pelargonate,	$C_2H_5C_9H_{17}O_2$	Pelargonic Ether.
Ethyl Ceanthate,	$C_2H_5C_7H_{13}O_2$	Ceanthic Ether.
Ethyl Sebicate,	$C_2H_5C_{10}H_{18}O_2$	Sebacic Ether.

Of the foregoing butyric ether resembles pineapple in flavor, and is often called pineapple oil. Ceanthic ether resembles the greengage or plum in flavor, pelargonic ether the quince, and sebacic ether the melon.

ÆTHER. U. S., Br. Ether. Ethyl Oxide.



The discovery of ether is attributed to Fabrenius; but it was studied afterward by Godfrey Haenkowitz in England and by Grosse in France in 1734, and described by them.

"A liquid composed of about 96 percent., by weight, of absolute Ether or Ethyl Oxide [$(C_2H_5)_2O=73.52$], and about 4 percent. of alcohol containing a little water. Ether should be kept in partially-filled, well-stoppered containers, preferably tin cans, in a cool place remote from lights or fire." < U. S. Sp. gr. 0.716 to 0.717 at 25°C. (77°F.).

This was known in the 1880 U. S. P. as **Ether Fortior**.

"A volatile liquid prepared from ethylic alcohol by interaction with sulphuric acid. It contains not less than 92 percent., by volume, of ethyl oxide, $(C_2H_5)_2O$. It was formerly termed sulphuric ether." < Br.

The ether of the other pharmacopœias varies but slightly in sp. gr. from the U. S. and Br. standards, and is practically the same in all European countries.

Preparation. No process is now given in the U. S. or Br. pharmacopœias for preparing ether, its production being given over to the manufacturing chemists. It is sufficient in a general way to state that alcohol, 95 percent., about 7 parts, and sulphuric acid, 66 percent., about 10 parts, are taken; the acid being placed in a retort and mixed with one third of the alcohol. The apparatus must be so arranged that alcohol may be continually added to the retort, which is suitably attached to a receiver, and arranged for cooling the liquid as it distils over. The interaction continues between the alcohol and acid, the heat being generated by it and maintained and regulated by the supply of alcohol which is allowed to enter the retort. When all the alcohol is added and the reaction is complete, the ether which has distilled over is purified and rectified and redistilled at a low degree of heat to secure the ether of proper sp. gr.

Properties. Ether is very volatile and inflammable. Its sp. gr. about 0.725, is lower than most liquid substances. It boils at about 35.5°C. (96°F.), U. S., 40.5°C. (105°F.), Br., and evaporates without leaving a residue. It is soluble in about ten times its volume of water and is miscible in all proportions with alcohol, chloroform, benzin and oils.

Uses. Ether is a solvent for most of the oils, resins and oleo-resins, and is used in making several important galenicals, as the oleo-resins, collodion, deodorized tincture of opium etc.

In medicine ether is employed internally as a sedative and anodyne; and by inhalation as an anæsthetic, (purified ether being generally employed for that purpose). It is also used as a local anæsthetic in the form of spray and as an ingredient in many anti-spasmodic preparations and anodynes,—both internally and externally.

Average dose.—1 Cc. (15 minims).

It may be given internally in doses of from 15 to 60 minims, poured upon a little cold water and taken at a draught, or mixed with alcohol as in Hoffmann's drops, or in the form of syrup, a dose being shaken with several times its weight of dry sugar, water being added, and taken at once.

Ether Commercial. Commercial ether which is quite generally furnished unless purified ether is specified, corresponds with the U. S. P. of 1880, which is described as "A liquid composed of 74 percent. of ethyl oxide and 26 percent. of alcohol containing a little water." Sp. gr. 0.750 at N. T.

Washed Ether or **Lethon** which is also found in commerce corresponds with the present Br. standard, being of the sp. gr. about 0.735 at N. T. This ether is purified by washing with water, but the water is not subsequently removed by redistillation as is described under purified ether. It contains about 92 percent. of ethyl oxide, and about 8 percent. of water.

ÆTHER PURIFICATUS. Br. Purified Ether.

"Ether from which most of the ethylic alcohol has been removed by washing with distilled water, and most of the water by subsequent distillation in the presence of calcium chloride and recently prepared lime." < Br.

Purified ether has the same general characteristics and properties as ether, and should be employed for inhalation.

ÆTHER ACETICUS. U. S., Br. Acetic Ether. Ethyl Acetate.

This ether was discovered by Lauraguais in 1750.

"A liquid composed of about 90 percent., by weight, of Ethyl Acetate [$\text{CH}_3\text{COOC}_2\text{H}_5=87.40$], and about 10 percent. of alcohol containing a little water. It should be kept in well-stoppered bottles in a cool and dark place, remote from lights and fires." < U. S.

"An ethereal liquid consisting of ethyl acetate, $\text{CH}_3\cdot\text{COO}(\text{C}_2\text{H}_5)$, together with unimportant amounts of ethylic alcohol or other substances, obtained by distillation from a mixture of ethylic alcohol, sulphuric acid and dried sodium acetate, digestion of the distillate with dried potassium carbonate and subsequent separation by dis-

tillation of the portion boiling between 165° and 172°F. (73.9° and 77°8C.).

Preparation. The Br. P. of 1885 gave a formula for making this ether corresponding with the above description, which was as follows:

Rectified Spirit,	32¼ fl.ounces
Sulphuric Acid,	32¼ fl.ounces
Acetate of Sodium,	40 ounces
Carbonate of Potassium, freshly dried,	6 ounces

To the spirit slowly add the acid, keeping the fluid cool, and, the product being cold, add the acetate, mixing thoroughly. Distil 45 fl.ounces. Digest the distillate with the carbonate of potassium for three days in a stoppered bottle. Separate the ethereal fluid and again distil until all but about 4 fl.ounces have passed over. Preserve the resulting acetic ether in a well-closed bottle and in a cool place.

Uses. This ether is employed in production of artificial fruit essences and flavors, and in some other preparations in which an ethereal acetic flavor is desired. It is but little used in medicine, and is seldom given internally, the dose being from 15 to 30 minims, (1 to 2 Cc.) if thus used.

Average dose.—1 Cc. (15 minims).

ÆTHER AMYL-NITROSUS. Amyl-Nitrite.

In several foreign pharmacopœias this preparation is official under the titles beginning with ether, but in the U. S., Br. and Ger. Ph. it is classed under its radical title as Amyl nitrite, (which see).

ÆTHER FORMICUS. Formic Ether. Ethyl Formate.



This ether was first made known by Bucholz in 1782.

Sodium Formate, dry,	9 parts
Alcohol, 90%,	9 parts
Sulphuric Acid,	10 parts

The sodium formate and alcohol are to be placed in a retort and the acid slowly added. When the acid is added heat enough is usually generated to vaporize the ether which forms and is condensed in a receiver surrounded by ice. If more heat is required it can be applied with a water-bath. The distilled ether is then to be agitated with an equal volume of water containing magnesia or lime in suspension, and afterwards separated and deprived of any water by rectification from calcium chloride.

Properties. Formic ether is a colorless, inflammable liquid, sp. gr. 0.918; boils at 53°C. (127.4°F.); soluble in 9 parts of water and in all proportions in alcohol and ether.

Uses. It is employed in making artificial fruit flavors, but is seldom used in medicine.

ÆTHER NITROSUS. Nitrous Ether. Ethyl Nitrite.

Under this title or the name of **Concentrated Nitrous Ether**, preparations have been extensively advertised and sold for the purpose of making Spirit of Nitrous Ether (which see). This ether is the same as is formed in the process of making this spirit, before the alcohol is added, and the concentrated nitrous ether may be made in the same manner as spirit of nitrous ether, up to the time of adding the alcohol. This is never prescribed or used except to make spirit of nitrous ether, which is made with one part, by weight, of nitrous ether, and nineteen parts, by weight, of alcohol.

This ether is very convenient, as it avoids keeping a large quantity of spirit of nitrous ether on hand, which would otherwise be necessary. It should be kept in a cool place and care must be exercised in opening the bottles, as it boils at a low temperature.

ÆTHEROLES or ETHEROLES.

Etherate of Ammonia. Water of ammonia, 22° , by weight, 1 part; ether, by weight, 1 part. Mix. This is used as an application for rheumatism, neuralgia, headache etc.

Etherate of Camphor. Camphor, by weight, 1 part; ether, (76 per cent.), by weight, 9 parts. Dissolve the camphor in the ether. This is used as an application for toothache, headache, pain, swelling etc., and as an antispasmodic for convulsions, croup etc. A saturated solution of camphor in ether is also used.

Etherate of Iodine, Magendie. Iodine, 1 part; ether, 15 parts. Dissolve.

Etherate of Mercury, Hufland's. Mercury, 1 part; ether, 60 parts. Dissolve.

Etherate of Phosphorus. Phosphorus 1 part, spirit or essence of peppermint 12 parts, ether 150 parts. Put the phosphorus with the essence in a small bottle tightly stopped and warm by water-bath until the phosphorus is melted, then add the ether and allow to macerate for several days with frequent agitation. This is similar to several tinctures and solutions of phosphorus, and may be used whenever phosphorus in a free state is indicated. Dose, 2 minims, on sugar. Two minims represent about $\frac{1}{80}$ grain of phosphorus. The above is the formula of Lobelius. Another etherate of phosphorus is sometimes used, but is an unsafe remedy on account of its strength. It is as follows:

Phosphorus,	1 part
Ether,	50 parts

Macerate with frequent agitation in a small well-stoppered bottle for thirty days.

Etherate of Sulphur. Washed sulphur 1 part, stronger ether 10 parts. Mix and macerate with frequent agitation for 30 days.

This is given as a preventative and cure for cholera and other zymotic and septic diseases.

Etherate of Turpentine. This is official in Nedl. S. under the title *Æther Terebinthinatus*. Purified oil of turpentine 1 part, ether 4 parts. Mix them.

Etherate of Zinc. Zinc chloride, by weight, 15 parts; ether, by weight, 60 parts; absolute alcohol, by weight, 30 parts. Mix and decant after standing a few hours. This is given as an antispasmodic in doses of 2 to 4 drops, administered in syrup.

ÆTHYLENI BICHORIDUM.

Ethylene Bichloride. (Dutch Liquid).

This liquid was discovered by Dutch chemists in 1795, and was used for a long time as an anodyne and anæsthetic until superseded by ether and chloroform. It is still much called for among the Holland Dutch. Its chemical formula is $C_2H_4Cl_2$. Sp. gr. 1.270, boils at $85^{\circ}C$. ($185^{\circ}F$). It is used by inhalation, the same as ether, or mixed with twice its weight of alcohol, making a preparation similar to Hoffmann's Anodyne, and given in doses of from 10 to 30 minims.

ÆTHYLIS CARBAMAS. U. S. Ethyl Carbamate.

"An ester of Carbamic Acid [$CO(OC_2H_5)NH_2$], obtained by the reaction of ethyl alcohol upon urea (carbamide) or one of its salts. It should be kept in well-stoppered bottles." <U. S.

This preparation is in colorless scales or crystals, and has a cool saline taste. It is soluble in less than one part of water, 0.6 part of alcohol and 3 parts of glycerin at $25^{\circ}C$. ($77^{\circ}F$).

Medicinal Uses. It is employed as an antispasmodic, hypnotic and sedative, and is particularly recommended in kidney troubles and irritability of the urinary tract.

Average dose.—1 Gm. (15 grains).

ÆTHYLIS CHLORIDUM. U. S. Ethyl Chloride.

Æther Hydrochloricus.

"A haloid derivative [Monochlor-Ethane, $C_2H_5Cl=64.00$], prepared by the action of hydrochloric acid gas upon absolute ethyl alcohol."

"On account of its extreme volatility, it should be preserved in hermetically sealed glass tubes, and kept in a cool place, remote from lights or fire." <U. S.

This is a colorless, very volatile, inflammable liquid of agreeable odor and burning taste. Sp. gr. 0.918 at $8^{\circ}C$. ($46.4^{\circ}F$). It is but slightly soluble in water but readily soluble in alcohol. It boils at 12.5° to $13^{\circ}C$. (54.5° to $55.4^{\circ}F$).

It is put up by manufacturers in 5 Cc. glass capsules with breakable end, for general anesthesia, and in 30, 50 and 60 Cc. graduated tubes with closures so that a portion may be used at a time, either for general or local anesthesia.

Uses. This is used only by inhalation or for local anesthesia. The dose by inhalation being 1 to 3 fl.drachms (4 to 12 Cc.).

ALCOHOLES — ALCOHOLS.

The general name Alcohol is applied to a class of substances which are, chemically, hydrates of a series of alcohol radicals. In pharmacy, alcohol is the hydrate of ethyl, and is obtained by distillation from fermented grains or other substances which contain starch or sugar, and have been subjected to fermentation.

Alcohol Radicals and Primary Radicals. In chemistry, the alcohol radicals constitute a homologous series which increases by CH_2 (one atom of carbon to two or hydrogen). This is known as the $\text{C}_n\text{H}_{2n+1}$ series (n equaling any number). Starting with hydrogen as a base, the radicals are built up by the successive additions of CH_2 .

Alcohol Radicals.	H]	Primary Alcohols.
[Hydrogen,	H]	
Methyl,	CH_3	Methyl (Wood Alcohol) CH_3OH
Ethyl,	C_2H_5	Ethyl (common alcohol) $\text{C}_2\text{H}_5\text{OH}$
Propyl (or Trityl),	C_3H_7	Propyl Alcohol, $\text{C}_3\text{H}_7\text{OH}$
Butyl (orTetryl),	C_4H_9	Butyl Alcohol, $\text{C}_4\text{H}_9\text{OH}$
Amyl,	C_5H_{11}	Amyl Alcohol, $\text{C}_5\text{H}_{11}\text{OH}$
Caproyl (or Hexyl),	C_6H_{13}	Hexyl Alcohol, $\text{C}_6\text{H}_{13}\text{OH}$
Enanthyl (or Heptyl),	C_7H_{15}	Heptyl Alcohol, $\text{C}_7\text{H}_{15}\text{OH}$
Capryl (or Octyl),	C_8H_{17}	Octyl Alcohol, $\text{C}_8\text{H}_{17}\text{OH}$
Nonyl,	C_9H_{19}	Nonyl Alcohol, $\text{C}_9\text{H}_{19}\text{OH}$

The foregoing primary alcohols are all liquids, their sp. gr. increasing with their molecular weight. To these may be added Cetyl Alcohol ($\text{C}_{16}\text{H}_{33}\text{HO}$), Ceryl Alcohol ($\text{C}_{27}\text{H}_{55}\text{HO}$), and Melissyl Alcohol ($\text{C}_{30}\text{H}_{61}\text{HO}$), which are white crystalline solids.

Alcohol radicals are gaseous in their free state. They form hydrides (which are mostly gaseous) with hydrogen; oxides or ethers (mostly liquid) with oxygen; hydrates with hydrogen and oxygen; aldehydes by the loss of hydrogen; and acids by combining one equivalent of oxygen with the aldehyde. The following table shows the changes that occur.

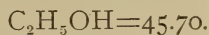
Alcohol Radicals and their Derivatives.

Methyl (CH_3) ₂ , hydride CH_3H ; oxide (ether) (CH_3) ₂ O; hydrate (alcohol) CH_3OH ; aldehyde CH_2O ; acid CH_2O_2 .
Ethyl (C_2H_5) ₂ , hydride $\text{C}_2\text{H}_5\text{H}$; oxide (ether) (C_2H_5) ₂ O; hydrate (alcohol) $\text{C}_2\text{H}_5\text{OH}$; aldehyde $\text{C}_2\text{H}_4\text{O}$; acid $\text{C}_2\text{H}_4\text{O}_2$.
Propyl (C_3H_7) ₂ , hydride $\text{C}_3\text{H}_7\text{H}$; oxide (ether) (C_3H_7) ₂ O; hydrate (alcohol) $\text{C}_3\text{H}_7\text{OH}$; aldehyde $\text{C}_3\text{H}_6\text{O}$; acid $\text{C}_3\text{H}_6\text{O}_2$.
Butyl (C_4H_9) ₂ , hydride $\text{C}_4\text{H}_9\text{H}$; oxide (ether) (C_4H_9) ₂ O; hydrate (alcohol) $\text{C}_4\text{H}_9\text{OH}$; aldehyde $\text{C}_4\text{H}_8\text{O}$; acid $\text{C}_4\text{H}_8\text{O}_2$.
Amyl (C_5H_{11}) ₂ , hydride $\text{C}_5\text{H}_{11}\text{H}$; oxide (ether) (C_5H_{11}) ₂ O; hydrate (alcohol) $\text{C}_5\text{H}_{11}\text{OH}$; aldehyde $\text{C}_5\text{H}_{10}\text{O}$; acid $\text{C}_5\text{H}_{10}\text{O}_2$.
Caproyl (C_6H_{13}) ₂ , hydride $\text{C}_6\text{H}_{13}\text{H}$; oxide (ether) (C_6H_{13}) ₂ O; hydrate alcohol) $\text{C}_6\text{H}_{13}\text{OH}$; aldehyde $\text{C}_6\text{H}_{12}\text{O}$; acid $\text{C}_6\text{H}_{12}\text{O}_2$.

Besides the above-mentioned primary alcohols, many other substances, which have the same elements in different combinations, are grouped with alcohols, as glycerin or glyceric alcohol ($C_3H_5(HO_3)$), the alcohols of the phenol series of which phenol or carbolic acid is a well known member, and many other less familiar substances.

Commercially, only two kinds of alcohol are known in this country, namely, grain alcohol (ethyl alcohol), which is known simply by the name "alcohol," and wood alcohol (methyl alcohol), which is usually known by that name, but is also sold under the proprietary titles Alcolin, Columbian Spirit etc. **Methylated spirit** is sold in Great Britain for manufacturing purposes, without tax. It is composed of 9 parts of alcohol and 1 part of wood alcohol, making it unfit for use as a beverage.

ALCOHOL. U. S. Alcohol. Ethyl Alcohol. Ethyl Hydrate.



"A liquid composed of about 92.3 percent., by weight, or about 94.9 percent., by volume, of absolute Ethyl Alcohol [$C_2H_5 \cdot OH=45.70$], and about 7.7 percent., by weight, of water." <U. S. Sp. gr. at $15.6^\circ C$. ($60^\circ F$.), the standard temperature for alcohol, about 0.816; at $25^\circ C$. ($77^\circ F$.), 0.809. It boils at $78^\circ C$. ($172^\circ F$.). Miscible with water in all proportions and also miscible with ether and chloroform. <U. S.

Commercial alcohol (188° proof), which is furnished by the distillers in this country corresponds very closely with this description. Ethyl hydrate is composed of carbon 52.67, hydrogen 12.90, oxygen 33.43 parts, by weight, in 100 parts. This, with a small percentage of water, is ethylic alcohol or the "alcohol" of commerce.

History. The name is derived from the Arabic "Al kohol," meaning a trituration or grinding. It was at first applied to the preparation of antimony, which, being triturated to a fine powder was used by Oriental women for painting their eyebrows. Afterwards it came to be used as a name for other fine powders and for highly-rectified spirits; but the use of the term seems to be arbitrary, rather than from any attribute or characteristic of the substance.

As the term is now used it refers to a highly concentrated distilled spirit; but the generic name **Alcohols** applies to a class of substances derived from hydro-carbon radicals by combination with hydroxyl.

Ethyl hydrate, to which the name "alcohol" is chiefly applied, is the spirit distilled from the product of vinous fermentation.

Alcohol was known to the alchemists and its discovery is said to be due to Albucasis and Arnold de Villeneuve in the twelfth century; but they probably knew only a weak spirit which might have been produced by the distillation of wine. Raymond Lully in the fourteenth century was acquainted with spirits of wine which he called "aqua ardens" and produced by distilling wine and concentrating the dis-

tillate by means of potassium carbonate, and (probably) redistillation. Richter and Lœwitz afterwards, by the use of quick-lime, succeeded in making alcohol nearly free from water; but it was not until the introduction of fractional distillation in 1801 by Adam, of Montpellier, France, that the production of alcohol on a commercial scale was made possible.

Source. It is obtained by distillation from fermented grain, fruit or other substances composed largely of starch or sugar. These substances are variously prepared and allowed to ferment, which develops alcohol, this is then recovered by distillation, a weak spirit being produced, which is concentrated by redistillation etc. In this country alcohol is principally made from common whiskey, by redistillation. When grain is used for making alcohol or spirits a portion of it is malted for the purpose of developing the diastase. The coarsely-ground unmalted grain is then scalded to soften the starchy matter, the malt is added, which converts the starch first into dextrin, and then into saccharine matter. It is then cooled, yeast is added, and the vinous fermentation begins, converting the saccharine matter into alcohol and liberating carbonic acid gas, (carbon dioxide). When fermentation has proceeded long enough the mash is put into stills, and the alcohol in a weak form (whiskey) is obtained. It is then redistilled to obtain the alcohol of commerce.

When alcohol is made from fruit or saccharine matter, the process begins with the vinous fermentation. Alcohol is the spirit or "spirits" present in wines, beer, cider and all still, malt and distilled liquors; its varying proportion determines the strength of the liquors.

It is now extensively produced from the refuse of beet sugar and sugar cane factories. Vinous fermentation is readily induced in the saccharine refuse, and, if properly manipulated, alcohol may be obtained. The pressed pulp of grapes used for making unfermented grape juice is also fermented, and alcohol (brandy) may be distilled from it. In California and some other sections where wine can be produced cheaply, spirit is extensively distilled from it. This is used for fortifying wines, making rectified liquors etc.

Proof of Spirits, or Alcohol. In this country liquors which contain one half, or 50 percent., by measure, of absolute alcohol are called **Proof**, or 100°. If they contain more than that they are called over or above proof, and if less, below proof, the proof being shown by adding to or subtracting from 100; thus whiskey, gin, rum and brandy are generally proof, or 100°. If five over proof, they would be called five above or over, or 105°, and if ten less than proof, they would be called 90° or ten below proof. Commercial alcohol is 188° or 88° over proof, or 94 percent., the percentage of alcohol by measure being always one half the proof degrees.

Proof Spirit. The United States Government official definition and standard of proof spirit is: "An alcoholic liquor which contains one-half its volume of absolute alcohol (sp gr. 0.7939 at 60°F.)." Spirit which corresponds to this requirement is marked 100 proof; spirit containing a less percentage of alcohol is marked less than 100, as 90, 85, 75 etc., containing a higher percentage of alcohol is marked over 100, as 105, which would be called 5 over proof.

High Wines. A name used by distillers for alcohol of somewhat lower proof than commercial alcohol, made by "doubling" low wines or singlings. No absolute percentage of alcohol is required in high wines, but it is customary to make them from 50 to 60 over proof, which is equivalent to alcohol of 150° to 160°.

Low Wines or **Singlings** is a name given to the weak spirit obtained from the first distillation of mash or other substances from which alcohol is distilled. They generally run from 75 to 100 proof, and are re-distilled or "doubled" to make high wines.

Spirits of Wine is an old name for alcohol, found in many old formulas. Alcohol was formerly distilled from wine, therefore the name "spirits of wine." It is probable that the formulas in which this is directed contemplates a preparation of less spirit strength than the present alcohol; but is generally safe to use alcohol where "spirits of wine" is directed.

Pure or Neutral Spirits. This is a name given to spirit of about 100° proof, which has been purified or deodorized. It is used chiefly by rectifiers or manufacturers of wines, cordials etc., for mixing. It is known in the market as "**Spirits**" and is like cologne spirit but only a little more than one half its strength.

Stronger Alcohol. This name was applied in the 1870 U. S. P. to alcohol having sp. gr. 0.817, corresponding to 190° or 95% absolute alcohol by volume. As this was a little stronger than commercial alcohol, and could not readily be obtained, it was very properly dismissed from later revisions. When this is directed in formulas, the ordinary commercial alcohol may be used.

Spiritus Rectificatus. Rectified spirit of the 1898 Br. P. is changed to 90 percent., by volume, of ethyl hydroxide (absolute alcohol) instead of 84 percent., as was directed in the 1885 revision. This change should be taken into consideration when making Br. formulas. It is the standard alcohol of Great Britain. (See *Spiritus Rectificatus*).

Spiritus, Weingeist of the Ph. Ger. 1900, is the "alcohol" of common use in Germany. It remains unchanged in the late revision. It corresponds with the present Br. P. Rectified Spirit, having 91.2 to 90 parts by volume of absolute alcohol in 100 parts.

Percentage of Alcohol. In making various pharmacopœial preparations, alcohol of different degrees or percentage is directed. In the U. S. 94% alcohol, which is the alcohol of commerce, and diluted alco-

hol, which is 48% of absolute alcohol, are official. In other pharmacopœias alcohol or Spiritus ranges from 90 to 95 percent., and diluted alcohol, or Spiritus Dilutus, ranges from 45 to 70 percent of absolute alcohol.

For convenient reference the relative measure of commercial alcohol and water required to make 100 parts of the several percentages directed in different pharmacopœias is given. Allowance is made for the contraction of volume which occurs when alcohol and water are mixed in varying proportions and the figures are based upon the quantity of the mixture after it has cooled to normal temperature, 15.6°C. (60°F.).

When alcohol and water are mixed, a slight contraction of volume occurs with a rise in temperature. The greatest contraction occurs when 52.6 volumes of alcohol are mixed with 47.4 volumes of water, it being 3.4 percent. This should be taken into account when making specified quantities of diluted alcohol.

To make 100 volumes of alcohol of certain percentage of absolute alcohol, from commercial alcohol, sp. gr. 0.820, and distilled water at N. T.

90%,	Alcohol 96 fl.parts,	water 4.65 fl.parts,	sp. gr. 0.8340
85%	Alcohol 91 fl.parts,	water 10.75 fl.parts,	sp. gr. 0.8496
80%	Alcohol 86 fl.parts,	water 16.00 fl.parts,	sp. gr. 0.8639
75%	Alcohol 80 fl.parts,	water 22.20 fl.parts,	sp. gr. 0.8767
70%	Alcohol 75 fl.parts,	water 27.60 fl.parts,	sp. gr. 0.8900
65%	Alcohol 69 fl.parts,	water 33.65 fl.parts,	sp. gr. 0.9025
60%	Alcohol 64 fl.parts,	water 38.75 fl.parts,	sp. gr. 0.9135
55%	Alcohol 59 fl.parts,	water 44.20 fl.parts,	sp. gr. 0.9242
50%	Alcohol 53 fl.parts,	water 50.00 fl.parts,	sp. gr. 0.9343
45%	Alcohol 48 fl.parts,	water 54.85 fl.parts,	sp. gr. 0.9434
40%	Alcohol 43 fl.parts,	water 59.80 fl.parts,	sp. gr. 0.9519
35%	Alcohol 37 fl.parts,	water 65.75 fl.parts,	sp. gr. 0.9593
30%	Alcohol 32 fl.parts,	water 70.25 fl.parts,	sp. gr. 0.9652
25%	Alcohol 27 fl.parts,	water 75.00 fl.parts,	sp. gr. 0.9709
20%	Alcohol 22 fl.parts,	water 82.00 fl.parts,	sp. gr. 0.9760
15%	Alcohol 16 fl.parts,	water 85.40 fl.parts,	sp. gr. 0.9815
10%	Alcohol 11 fl.parts,	water 90.00 fl.parts,	sp. gr. 0.9869

The foregoing proportions may not be strictly exact as to the terminal decimals of water but are close enough for all ordinary uses.

If percentage by weight instead of by measure is wanted it may readily be calculated from the table of weights with measure equivalents of alcohol, or by dividing 91, which is the weight percent. of commercial alcohol, by the percentage required and deducting 1 from the quotient. This gives the percentage of water to be added: For example—if 75 percent. alcohol, by weight, is wanted—

$91 \div 75 = 1.21 - 1$, leaving 0.21, or 21 parts by weight of water to be mixed with 79 parts of commercial alcohol to make 75%, by weight, alcohol.

Alcohol in Pharmacy. Alcohol is used in pharmacy to extract or dissolve the properties of drugs and to preserve their solutions. No other solvent of medicinal substances has been found of such universal value and application. A large share of the liquid preparations that are used in pharmacy contain alcohol and depend upon its solvent power and preservative virtue for their value. Besides this, it is used in making most of the solid extracts, abstracts, alkaloids, resinoids and many other solid preparations.

The liquid preparations in which alcohol is used as a solvent of medicinal principles, or for their preservation, may be classified as follows:

Cordials and Elixirs which contain aromatic substances and mild medicines, sweetened and combined with sufficient alcohol to keep them and hold their properties in solution.

Essences and Flavoring Extracts, which are mostly made from essential oils, or aromatic substances dissolved in alcohol.

Fluid and Liquid Extracts, which contain a large quantity of medicinal value held in solution by alcohol or diluted alcohol.

Liquors of all kinds, which are mainly alcohol in some form, diluted and flavored with the substances peculiar to the kind.

Spirits, which are solutions of essential oils, (aromatic substances etc.), in alcohol, and among which may be included perfumes.

Solutions, which contain alcohol, either as a solvent or preservative, as solutions of gums, resins, acids, alkaloids etc.

Tinctures, which are mainly solutions of the medicinal principles of drugs in alcohol or diluted alcohol.

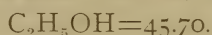
To these may be added the abstracts, solid extracts, alkaloids, and medicinal principles of drugs generally, which are obtained by the aid of alcohol, and it will be seen that in pharmacy it is the most important of any substance, in fact, entirely indispensable in its practice.

Alcoholates. This is a general name for preparations in which alcohol is used to extract the medicinal properties of substances. In French pharmacy alcohol is called **Alcool**, and alcoholic preparations are classified according to the manner of preparing them and the substances used.

Alcoolats. These are medicated distilled spirits, made by macerating aromatic or other substances with alcohol and distilling. There are no U. S. official preparations corresponding with them.

THE NATIONAL PURE FOOD AND DRUGS LAW.

U. S. Food and Drugs Act. June 30, 1906. This Act requires that the percentage, by volume, of Absolute Alcohol, be stated on the label of any preparation intended for Inter-State Commerce.

ALCOHOL ABSOLUTUM. U. S., Br. Absolute Alcohol.

"Ethyl Alcohol [$\text{C}_2\text{H}_5\text{OH}=45.70$], containing not more than 1 per cent., by weight, of water." < U. S. Sp. gr. not higher than 0.797 at N. T., or 0.90 at 25°C . (77°F)."

"Ethyl hydroxide, $\text{C}_2\text{H}_5\text{OH}$, with not more than 1 per cent., by weight, of water; obtained by the removal of water from less strong ethylic alcohol, and subsequent distillation." < Br. Sp. gr. from 0.794 to 0.796.

Preparation. No process for preparing absolute alcohol is now official. The 1885 Br. P. under the title Alcohol Ethylicum, gave a formula for making it from rectified spirit by first agitating it with dried potassium carbonate, then with calcium chloride, and then distilling three-fourths as much as the volume of rectified spirit first taken. As the rectified spirit of the Br. 1885 revision contained 16 per cent. of water, and that of the 1898 revision contains 10 per cent., the formula then employed would not be correct. The following formula based on the 188° or 94 per cent. commercial alcohol of this country will make a satisfactory preparation:

Alcohol,	32 fl.ounces
Potassium Carbonate, dried,	2 ounces av.
Calcium Chloride, freshly fused,	6 ounces av.

Add the recently dried potassium carbonate to the alcohol, and shake vigorously several times during twenty-four hours. Pour the spirit from the potassium carbonate into a retort from which it may be distilled, and add to it the calcium chloride which must be freshly fused in a crucible to which a red heat is applied for half an hour, then poured upon a slab, covered with an evaporating dish until cool, and broken up into small pieces before adding to the alcohol. Shake this occasionally during twenty-four hours, then attach a dry receiver to the flask or retort, and having it arranged so as to prevent the access of air, apply heat to the retort, and distil until 24 fl.ounces have passed. Keep the distillate, which is absolute alcohol, in small well-corked bottles.

For the ordinary purposes of pharmacy an absolute alcohol sufficiently free from water to meet most requirements may be made by first shaking 32 fl.ounces of alcohol with 2 ounces av. of dried potassium carbonate during twenty-four hours, then pouring off and adding to the alcohol 4 ounces av. of quick-lime in small pieces or in coarse powder and shaking as before and allowing to remain a week or more, then pouring off the liquid and filtering. While this is not absolutely absolute, it is sufficiently so for most purposes. It may be readily tested by adding to a portion of it a few grains of cupric sulphate dried or rendered anhydrous by heating for a considerable time at 100°C . (212°F .), when it loses most of its water. If water is

present in the alcohol, a blue color will occur, but if it is nearly anhydrous, only a tint will be observed.

Properties and Uses. In general the properties of absolute alcohol correspond with commercial alcohol. It boils at 78.4°C . (173.1°F .), and becomes congealed at -130.5°C .

It is used in many chemical operations and in making delicate tests. In pharmacy it is used in making some unofficial preparations and solutions of phosphorus etc., and is directed in the Br. P. in making chloroform and solution of sodium ethylate. It is also used as a solvent for some alkaloids, resins and vegetable principles where the presence of water would be inadmissible.

ALCOHOL DENATURIZED.

Denaturized Alcohol. Industrial Alcohol.

"Until January 1, 1907, the United States was the only important manufacturing and commercial country in the world that made no distinction in taxation between alcohol as a beverage and alcohol as an industrial substance." At that time a law became effective, authorizing the use of Denaturized Alcohol for industrial purposes without revenue tax, under certain government restrictions as to composition and sale. The first denaturized alcohol authorized by the Internal Revenue department required a mixture of

Ethyl Alcohol, not less than 90%,	100	gallons
Crude Methyl Alcohol, (Wood Alcohol),	10	gallons
Benzene,	$\frac{1}{2}$	gallon

Afterwards, fearing that this mixture might be so manipulated as to make it available for drinking purposes, the formula was changed to

Ethyl Alcohol,	100	gallons
Methyl Alcohol,	2	gallons
Bone Oil, (a mixture of pyridine bases),	$\frac{1}{2}$	gallon

Later, permits have been granted to manufacturers of special compounds to denaturize ethyl alcohol with substances that may be employed in their particular business, as manufacturers of celluloid may use camphor for denaturizing; manufacturers of embalming fluids may use a less proportion of methyl alcohol; photo engravers may use cadmium iodide; tobacco manufacturers may denaturize rum of 75% alcohol strength with nicotine etc. The object of denaturizing is to avoid payment of the tax on alcohol amounting to about \$2.08 per gallon. As alcohol can be produced from so many substances, and is useful for so many industrial purposes, the advent of denaturized alcohol, which may be used by manufacturers, and as fuel and light by the public, is hailed as one of the most important economic movements of the present century.

Denaturized alcohol is now furnished by the wholesale drug trade and may be used by retail druggists for many purposes, although its

use in medicine, either internal or external, is prohibited. It is an excellent solvent for shellac and for lacquers, and may be used in the manufacture of many preparations in which alcohol has heretofore been used. The uses of denaturized alcohol, in general, are unlimited and cannot be considered in this article. The price, at present, is about 50 cents per gallon in a small way, but it is probable that this will be considerably reduced and that the use of this form of alcohol will become very general. Lamps and stoves for burning alcohol are specially constructed.

Solid Alcohol. In Germany a form of "solid alcohol" called "Smaragdin" is prepared. A cheap, harmless form of gun-cotton is soaked in a mixture of alcohol with a little ether. It sells for about 60 cents per pound and requires no special form of stove.

ALCOHOL DEODORATUM. Deodorized Alcohol.

Cologne Spirit.

This was official in the 1890 U. S. P., but was dismissed in the 8th revision.

Cologne Spirit of commerce, in this country, is practically, the alcohol of the U. S. P. It differs very slightly from the official alcohol, except that it has no odor and is, therefore, better suited for making many of the pharmaceutical preparations as well as all perfumes, toilet waters, essences, spirits etc., where the odor of ordinary alcohol is undesirable. It is also extensively used in the fabrication of liquors, the fortification of wines, and in other weakly alcoholic fermented beverages.

As the price of cologne spirit is only a trifle more per gallon it is used and sold by many druggists altogether instead of alcohol.

The Stronger Alcohol of the 1870 U. S. P. corresponded very nearly to this in spirit strength.

Preparation. Deodorized alcohol may be prepared by several processes. It was formerly prepared from ordinary alcohol by filtering it through many alternate layers of animal charcoal and sand.

Commercial cologne spirit however, is now chiefly prepared by the large distillers during the process of distillation by reserving the "middle run" of the distillate which is practically free from the lighter ethers which come over first, and fusel oil which comes over last in the fractional distillation

Atwood's Patent Alcohol, which is considered the best deodorized alcohol, is prepared by acting upon ordinary alcohol with potassium or sodium permanganate, which oxidizes the fusel oil and other similar objectionable liquids. The alcohol is then redistilled and separated from the products of oxidation. Many other methods are also employed, it being the purpose of all to free the alcohol from fusel oil and other foreign matters.

A still cleaner grade of deodorized alcohol is demanded by perfumers, and is known as **Perfumer's Alcohol**.

French Cologne Spirit is deodorized alcohol, prepared from brandy or wine lees by purification. It is used in France for making perfumes, but is little known in this country. A considerable quantity of deodorized spirit, (but not of full alcoholic strength) is made in California from wine and wine lees, and is used there and in the eastern U. S. for fortifying wines.

ALCOHOL DILUTUM. U. S. Diluted Alcohol.

"A liquid composed of about 41.5 percent., by weight, or about 48.9 percent., by volume, of ethyl alcohol ($C_2H_5OH=45.70$), and about 58.5 percent., by weight, of water." < U. S. Sp. gr. about 0.936 at N. T., or about 0.930 at 25°C. (77°F.).

Alcohol, 500 Cc. or 16 fl.ounces

Distilled Water, 500 Cc. or 16 fl.ounces

Mix them.

"If the two liquids be measured at the temperature of 25°C. (77°F.), the mixture, when cooled to the same temperature will measure 970 Cc.," showing a molecular contraction of 0.030 in volume.

If it is desirable to combine by weight instead of volume as above, diluted alcohol may be prepared with

Alcohol, 408 Gm. or 40.8 ounces av.

Distilled Water, 500 Gm. or 50 ounces av.

Mix them.

Equal volumes of alcohol and water of the U. S. standard make the U. S. diluted alcohol.

The present (1898) Br. P. has no one preparation that is now termed "diluted alcohol," but under the title *Spiritus Rectificatus* four liquids of varying percentages of alcohol are specified; as alcohol, (90 percent.); alcohol, (70 percent.); alcohol, (60 percent.); alcohol, (45 percent). See *Spiritus Rectificatus*.

Spiritus Tenuior, the **Proof Spirit** of the 1885 Br. P. which contained about 49 percent., by weight, or 57 percent., by volume, of absolute alcohol, corresponds more nearly to the Br. 60 percent. alcohol than any other, being made by mixing 100 fl.ounces of 90 percent. alcohol, **Spiritus Rectificatus**, with 53.65 fl.ounces of distilled water. This has sp. gr. 0.9135, while *Spiritus Tenuior* of the 1885 revision was 0.920.

ALCOHOL AMYLICUM.

Amylic Alcohol. Fousel Oil. Amyl Hydrate.



This is a "liquid of oily consistence contained in the crude spirit produced by the fermentation of saccharine solutions with yeast, and

separated in the rectification or distillation of such crude spirit." Br. 1885. (Now dismissed). It is the hydrate of the radical amyl (C_5H_{11}), and is commercially known as Fusel or Fousel Oil. When pure its sp. gr. is 0.818. It boils at $132^{\circ}C.$ ($269.6^{\circ}F.$). It is the base of many of the so-called fruit ethers or artificial fruit flavors and of most of the artificial liquor flavors, and is used in medicine for making amyl nitrite and sodium valerianate.

Fusel oil is present in spirits obtained from grain, about one part in five hundred; but it is much more abundant in spirit obtained from fermented potatoes. It is found in the milky distillate that comes over after most of the spirit has passed; after standing, it floats on the top and may be distilled from the milky liquid by heating it to $132^{\circ}C.$ ($269^{\circ}F.$), at which point the fusel oil boils and comes over, and may be separated.

ALCOHOL METHYLICUM. Methyllic Alcohol. Wood Alcohol.

Wood Naphtha. Methyl Hydrate. Carbinol.



This alcohol is produced by the destructive distillation of wood, hence it is called wood alcohol, pyroxylic spirit or wood naphtha. It is chemically the hydrate of the radical methyl (CH_3); its specific gravity is 0.789; it boils at about $65^{\circ}C.$ ($149^{\circ}F.$). It is used considerably in making varnishes and many other preparations as a substitute for alcohol, but on account of its peculiar odor cannot replace ethyl alcohol in medicinal preparations, but is considerably used in making some kinds of chemicals, as salicylic acid etc. It was formerly used as a remedy for consumption and chronic catarrh, but its internal administration is now entirely abandoned.

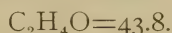
It was first observed by Taylor in 1812, but was not fully investigated until 1835 by Dumas and Peligot. It occurs, combined with other liquid products of destructive distillation, to the amount of about 1 percent. When chalk is added to the crude, distilled product, calcium acetate is deposited. This is distilled at a low heat, and crude methyllic alcohol is condensed in a receiver. This is then purified by dissolving in it calcium chloride to saturation, when a crystalline compound results which is not decomposed by the heat of a water-bath, but which yields by distillation acetone etc. The residue remaining is then diluted with water and heated when dilute methyl alcohol passes over, and is subsequently concentrated by treatment with quick-lime which removes water.

U. S. Pure Food and Drugs Act. Under this Act "The term "Alcohol" is defined to mean common or ethyl alcohol. No other kind of alcohol is permissible in the manufacture of medicines except as specified in the United States Pharmacopœia or National Formulary."

ALDEHYDES — ALDEHYDS.

Aldehydes are derived from alcohols by the elimination of H_2 from the hydrates of the alcohol radicals. Aldehyds corresponding to eleven of the primary alcohols have been discovered. Although but one is known in pharmacy, namely **Acetic Aldehyd**, C_2H_4O (from ethyl alcohol), and that is seldom used. The chemical composition of several of the aldehydes will be found elsewhere in this book.

The aldehydes are intermediate in position between alcohols and acids—the first step in the oxidation (or dehydration) of alcohols, which, when continued, converts them into acids. They unite with ammonia, forming aldehyd-ammonias, which by losing water condense into the basic substances, aldines and oxaldines. The aromatic aldehyds, as benzoic, cumic, salicylic, cinnamic etc., are obtained from essential oils or from plants yielding essential oils which, when acted upon by ammonia produce hydramides.

ALDEHYDE. Acetic Aldehyde.

Acetic aldehyde is naturally produced by the oxidation or dehydration of alcohol resulting from vinous fermentation. The natural conversion of ethylic alcohol into aldehyde has been described in the article on *Acetum*. (Which see).

Aldehyde may be prepared by mixing three parts of eighty percent. alcohol with two parts of nitric acid, distilling, purifying, separating and redistilling. The nitric acid combines with the alcohol and unites with a portion of its hydrogen to form nitrous ether and aldehyde, which are distilled together and treated with ammonia gas. The nitrous ether separates as a layer floating on the solution of ammonia aldehyde and may be separated and utilized. The solution of ammonia aldehyde is then mixed with diluted sulphuric acid, and redistilled over chloride of calcium. The sp. gr. of aldehyde is 0.805 at $0^\circ C.$ ($32^\circ F.$). It is antiputrescent, and has properties somewhat similar to ether, but is not used in medicine. Several of its derivatives, however, as chloroform and chloral, are much employed.

Acetals are compounds made by combining aldehydes and alcohols, with elimination of water. **Bromal, Iodal, Chloral and Butyl Chloral** are derivatives of aldehyd.

Paraldehyde. $C_6H_{12}O_3=131.10$. This is official in the U. S. P. and is described under the title *Paraldehydum*, which see.

ALKALIES.

Commercially, the hydrate (hydroxide) of sodium (caustic soda), and the hydrate (hydroxide) of potassium (caustic potassa) only, are known as alkalies; but in pharmacy the carbonates of these metals and of ammonium, the solution of gaseous ammonia in water (water

of ammonia) and, indirectly, the hydrates and carbonates of lithium, barium, calcium, strontium and magnesium are classed with the alkalies. In a general way alkalies are known as bases, which combine with fatty acids to form soaps or oleates; which combine with acids to form neutral salts; which turn red litmus blue, or yellow turmeric brown, and which are in every way the reverse of acids. The manufacture of soda and potassa alkalies constitutes a great commercial industry. These manufacturies are known as alkali-works, and are mostly devoted to the manufacture of soda alkali.

Soda Ash of commerce is the impure carbonate of sodium which is the basis of the soda alkali. (See Sodium Carbonate).

Potash or **Pearlash** is impure carbonate of potash, the base of the potassa alkali. (See Potassium Carbonate). The so-called alkalies are the bases of a great variety of chemicals used in medicine and extensively employed in many important manufacturing industries and in the arts. They are sometimes named from their source of supply, as ammonia is called **animal alkali**; potassa **vegetable alkali**; soda **mineral alkali**; barium, calcium, strontium and magnesia **alkaline earths** etc. The alkalies and their uses will be further noted under the headings of the substances which compose them.

ALKALOIDES — ALKALOIDS.

The name Alkaloids is given to a class of organic bases which (like alkalies) combine with acids to forms salts. The alkaloids and their salts represent the active medicinal properties of most vegetable drugs and form a very important class of chemicals. The manufacture of alkaloids and their salts is chiefly carried on by manufacturing chemists, and a large amount of capital is thus employed.

Alkaloids may be classed as natural and artificial. The natural alkaloids are obtained from organic substances, (animal or vegetable) in which they exist combined with other substances, and the artificial are produced by the skill of the chemist. The natural alkaloids all contain nitrogen with hydrogen as a base, and are probably derivatives of the ammonia type (NH_3). Carbon is present in all, and oxygen in most of them. Alkaloids which contain the four elements, $\text{C}, \text{H}, \text{N}, \text{O}$, are called **Amides**. They are generally non-volatile crystallizable solids, representing the active principles of vegetable and animal substances from which they are obtained. Alkaloids which contain only the three elements, $\text{C}, \text{H}, \text{N}$, are called **Amines**. They are generally volatile liquids, artificially made by substituting hydrocarbon radicals wholly or partly for the hydrogen of the typical ammonia base.

Considerable confusion formerly existed because of the lack of uniformity of the terminations of the names of alkaloids—some

ending with **ia** and some with **ine**, as morphia, quinine etc., but in the late revisions of the American and British Pharmacopœias the terminal letters of the English names of alkaloids are uniformly **ine**. It should, therefore, be remembered that in the older works of pharmacy the names of the alkaloids that terminated in **ia** would now be written **ine**.

As alkaloids are, so to speak, the concentrated principles of the substances from which they are derived, they are very powerful, compared with the crude substances, the dose of many of them being very minute. Their salts, being more soluble, are mainly used in medicine. Several alkaloids varying in composition and characteristics are sometimes obtained from one plant, but in the main they are true representatives of the drug in properties and actions.

Alkaloids are generally insoluble, or but sparingly soluble in water, but are readily dissolved in alcohol, chloroform and the liquid hydrocarbons. They form salts with acids, generally soluble in water. From aqueous solutions of these salts the alkaloids are precipitated by alkalies, because of the stronger attraction of the acids for the alkali than the alkaloidal base.

The alkaloids are mainly used in pharmacy as bases for preparing their salts, and are but little employed in medicine, their soluble salts being used instead. It is therefore unnecessary to give explicit formulæ for all of them, but only such as are more frequently employed and the general processes which may apply to the remainder.

The following general directions for preparing alkaloids from crude drugs are therefore given, but it may be stated that they can only be considered general directions, and that some special treatment, requiring experience and chemical knowledge is necessary to successfully obtain and separate the alkaloids of most substances. They are therefore, generally supplied by competent manufacturing chemists.

General Directions for Preparing Alkaloids.

I. For alkaloids slightly soluble in water, or which exist in the plants etc., in the form of acids, or soluble salts of alkaloids.

Macerate the drug in coarse powder twenty-four hours, in water sufficient to cover it; then pack it moderately in the water-bath percolator, adding water freely, and heat to boiling; then begin to percolate, adding water through the percolator, and continue the heat and percolation until the drug is exhausted; strain the percolate while hot and slowly add to the liquid, water of ammonia or liquor of potassa so long as much precipitation continues; allow to settle; pour off the liquid, pour the precipitate on a filter, wash with a little water, press, dissolve in very dilute acetic or hydrochloric acid, precipitate again with ammonia or potassa, pour off, drain, and repeat the operation as many times as may be necessary to purify the al-

kaloids. The product is the alkaloids of the drug, which are partially soluble in water. If necessary, they must be separated by various means, recrystallized and dried. The liquors which are poured off contain a small percentage of the alkaloids, which may be recovered by evaporating them and treating in the same manner as directed.

2. For alkaloids insoluble in water.

Macerate the drug, in moderately fine powder, for twenty-four hours, with sufficient alcohol to cover it, pack firmly in the water-bath percolator, pour sufficient alcohol upon it, heat moderately for an hour and begin to percolate, adding alcohol to the drug and continuing the heat and percolation until its strength is exhausted; distil off most of the alcohol and to the residue add sufficient very dilute acetic or muriatic acid to dissolve the alkaloids that are in the soft extract; this is best accomplished by washing it with several portions of the dilute acid; filter the acid solution and add to it sufficient water of ammonia or liquor potassa to precipitate the alkaloids; wash the precipitate on a filter with water and redissolve and reprecipitate if necessary. The product is the alkaloids soluble in alcohol that were contained in the drug and they must be separated if necessary.

Many other processes are employed for obtaining alkaloids, as boiling the drug with dilute acid, precipitating with an alkali etc., but the foregoing are sufficient to show the general methods. It may be explained in regard to the foregoing processes that the heat employed serves to dissolve the alkaloids, the same as the acids which are used in other processes, and the subsequent treatment is less troublesome; for example: strychnine dissolves in 12 parts of boiling or 110 parts of cold alcohol; quinine in 2 parts boiling or 6 parts of cold alcohol; caffeine in 10 parts of boiling or 75 parts of cold water; therefore, when drugs are percolated with a boiling or heated menstruum, their alkaloids are as readily dissolved as when acids are used, and their subsequent separation is much more simple.

Important Alkaloids and their Salts.

Of the alkaloids known and named by chemists, but few are used in medicine, and most of them are unimportant except as chemical products and curiosities. Of the small number which are used in medicine but few are employed as alkaloids, but mainly their salts formed by the union of these organic bases with acids.

The alkaloids are generally used for making oleates because they will combine with oleic acid, while their salts will not. Some of them are also employed in delicate preparations where acids with which they are combined would be inadmissible.

Most alkaloids official in the various pharmacopœias will be noticed in the alphabetical order of their Latin titles in this volume, but many others, not official, are noticed under the drugs from which they are

prepared. Many other alkaloids have been isolated, but are not as yet employed in medicine, and the list of medicinal agents is already so large that they have not been included in this work.

ALLYL. Acryl. Propylenyl.



The radical of the essential oils, containing sulphur, called Allyl. It is univalent and is known only through its compounds, but its double molecule, diallyl (C_3H_5)₂, is a pungent, volatile liquid. Like other radicals it forms an ether, alcohol, aldehyde and acid; also salts with the halogens, as iodine, bromine etc., and with some acids. The plants and oils containing this radical combined with sulphur have peculiar pungent, penetrating odors which cannot be mistaken. Asafoetida, scurvy grass, cress, garlic, leek, horseradish, radish, shepherd's purse, wallflower, mustard, onion, nasturium and many other less familiar plants owe their peculiar odors and pungency to combinations of the allyl radical with some form of sulphur. The allyl and glyceryl radicals are isomeric, being identical in composition, but the former is univalent and the latter trivalent.

Allyl Hydrate. $\text{C}_3\text{H}_5\text{OH}$. (Allyl Alcohol. By uniting with the elements of water allyl forms a hydrate or alcohol which boils at 96°C. It has no present use in pharmacy.

Allyl Sulphide. (C_3H_5)₂S. (Artificial Oil of Garlic). This is artificially produced by decomposing allyl iodide with an alcohol solution of potassium sulphide. Its composition is the same as the natural Volatile Oil of Garlic.

Allyl Sulphocyanate. $\text{C}_3\text{H}_5\text{CNS}$. (Artificial Oil or Mustard). This is prepared by distilling allyl sulphate with potassium isothiocyanate, or by gently heating a mixed alcoholic solution of allyl sulphide and mercury bichloride, with potassium sulphocyanide. It is identical in composition with the natural Volatile Oil of Mustard, which is chemically allyl isothiocyanate.

The volatile oil of mustard is used in some liniments and pain relievers. Its vapor is very irritating and care must be used in dispensing it. It should be very much diluted when employed.

Allyl Sulphocarbamide. This is known as **Thiosinamine**. See this title.

Allyl Tribromide. A combination of allyl and bromine. A yellow liquid, sedative and antispasmodic. Dose 5 to 10 minims.

Allyl Iodide. A compound of allyl and iodine, sometimes used in medicine.

ALOE. U. S. Aloes.

"The inspissated juice of the leaves of Aloe Vera (Linné) Webb, Aloe Chinensis Baker, Aloe Perryi Baker, or other species of Aloe (Fam. Liliaceæ). <U. S.

The U. S. P. recognizes the several species of aloes found in the market, which are more particularly described under the title Aloe in the Organic Materia Section, Part I.

The Br. P. designates **Aloe Barbarensis**, Barbados Aloes, and **Aloe Socotrina**, Socotrine Aloes, as official.

Aloes of various kinds are official in all pharmacopœias and are named Aloes in all but the Spanish, in which language it is *Acibar*.

Preparation. The fleshy leaves of the Aloe are cut off near the base their juice allowed to drain into troughs or vessels. The collected juice is then evaporated to the consistence of an extract and run into boxes, kegs or gourds in which form it is brought to the market.

Properties and Uses. Aloes is a well-known and much-used purgative. It is the important ingredient of many pills and liquid medicines which are sold as laxatives and physics.

Dose.—The laxative dose of aloes is from 2 to 3 grains and the purgative dose from 8 to 15 grains.

Average dose.—U. S. 0.250 Gm.=250 milligrammes, (4 grains).

ALOE PURIFICATA. U. S. Purified Aloes.

As aloes comes to the market it frequently contains some foreign substances, as sticks, stones, dirt etc. To remove these the U. S. P. presents the formula for Purified Aloes, which is:

"Aloes,	1000 Gm. or 10 ounces av.
Alcohol,	200 Cc. or 2 fl.ounces

Heat the aloes by means of a water-bath until it is completely melted. Then add the alcohol, and having stirred the mixture thoroughly, strain it through a No. 60 sieve, which has just been dipped into boiling water. Evaporate the strained mixture by means of a water-bath, constantly stirring, until a thread of the mass becomes brittle on cooling. Lastly break up the product, when cold, into pieces of a convenient size, and keep in well-stoppered bottles." <U. S.

Its uses are the same as aloes; it is almost entirely soluble in alcohol.

Average dose.—0.250 Gm.=250 milligrammes, (4 grains).

ALOE LIQUIDA. Liquid Aloes.

This is official in some of the European pharmacopœias. It may be prepared as follows:

Aloes,	50 parts or 5 ounces av.
Sodium Carbonate,	1 part or 22 grains
Ammonia Water, (17%)	5 parts or ½ fl.ounce
Water,	45 parts or 4½ fl.ounces

Mix, macerate and filter.

This is a convenient liquid preparation of aloes, which may be used instead of it, by giving double the number of minims as would be given of aloes in grains. Say, average dose 6 to 10 minims.

ALOINUM. U. S., Br. Aloin.

"A neutral principle obtained from Aloes, varying more or less in chemical composition and physical properties according to the source from which it is obtained, chiefly prepared from Curaçao Aloes." <U. S.

"Aloin is extracted from Barbados or Socotrine Aloes by solvents and purified by recrystallization. The products from the different varieties of Aloes possess similar properties. The Aloin extracted from Barbados Aloes has the formula, $C_{16}H_{16}O_{7.3}H_2O$." <Br.

Preparation. Aloin is obtained by treating aloes with acidulated boiling water, which dissolves the aloin and resinous matter. After standing for some hours to cool, the liquid is poured off from the resinous precipitate and evaporated by means of a sand-bath to the consistency of syrup. When cool, crystals of aloin form, and may be purified by repeated crystallization from hot alcoholic solution.

Properties and Dose. Aloin has the laxative and cathartic properties of aloes in a concentrated form, and is a useful ingredient in little pills and other medicine where a small dose of the medicament is desirable. The laxative dose is $\frac{1}{8}$ to $\frac{1}{4}$ grain, the purgative dose from 1 to 2 grains.

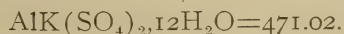
Average dose.—0.65 Gm.=65 milligrammes, (1 grain).

ALPHOL.

This is chemically, alpha-naphthol salicylate. It is produced by heating alpha-naphthol-sodium and sodium salicylate with phosphorus oxychloride. A reddish-white crystalline powder, soluble in alcohol and fatty oils. It may be used as an internal antiseptic and in rheumatism. Dose 1 to 15 grains.

ALPHOZONE.

This name is applied to succinic peroxide or disuccinyl peroxide. It is a white light powder, soluble in 30 parts of water. Employed as a germicide and antiseptic, externally on wounds, ulcers, and for tonsillitis, leucorrhœa etc.; internally as an antiseptic and antiferment. Dose 1 grain in tablets or in solution.

ALUMEN. U. S.; Br. Alum.

This is the official **potassium-alum** (Alumini et Potassii Sulphas).

The alum of commerce is **ammonia-alum**. It is to be regretted that the official salt is not the same as the commercial, for, on account of their difference, the official salt is seldom used in this country, commercial alum being supplied unless potassium alum is specially directed.

Preparation. Potassium alum is prepared by treating alum-clay with sulphuric acid to form aluminum sulphate, then adding potassium sulphate, which unites to form the double salt. Ammonia-alum is made in a similar way, ammonium sulphate being used instead of potassium sulphate.

Alum is a powerful astringent, and is used externally as a wash, styptic etc. It is also given internally as an astringent and in croup

as an emetic, and is much used as an astringent injection and gargle.

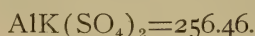
Potassium-alum is soluble in about ten parts of cold water, while ammonia-alum requires about sixteen parts; freely soluble in glycerin; insoluble in alcohol.

Average dose.—0.500 Gm.=500 milligrammes, ($7\frac{1}{2}$ grains).

Alum Curd. Alum in the form of curd, made by rubbing white of egg with a lump of alum until it is coagulated, or by mixing half a teaspoonful of powdered alum with the white of one egg, is considerably used as a "poultice" for inflammation, especially of the eye.

Alum Whey is a domestic remedy, made by boiling a large teaspoonful (60 grains) of powdered alum with a glassful (about 10 fl.ounces) of milk, and straining when cool. The liquid is taken in doses of a wineglassful for looseness of the bowels etc.

ALUMEN EXSICCATUM. U. S., Br. Dried or "Burnt" Alum.



Preparation. This is officially made by exposing 100 grammes or parts of alum for several days to a temperature of 80°C . (176°F .), until it has thoroughly effloresced and then placing it in a porcelain capsule and gradually heating it to a temperature of 200°C . (392°F .) and continuing the heat until the mass becomes white and porous and weighs 55 grammes or parts. When cold it is to be powdered and preserved in well-stoppered bottles.

As found in commerce it is usually made from commercial ammonia-alum by melting it in an iron kettle, and continuing the heat until the water of crystallization has entirely evaporated. In a domestic way it is made by putting a lump of alum on a hot stove and letting it remain until it is dry.

With this, as with the official alum, potassium-alum is seldom employed to make it, ammonia-alum being used instead.

Uses. As this is simply alum deprived of its water of crystallization it has the same general properties as alum, but is much more powerful. It is slowly soluble in 17 parts of water at 25°C . (77°F .), and in 14 parts of boiling water, insoluble in alcohol. It is chiefly used as an escharotic for removing "proud flesh" or other morbid growths. It is also used for hemorrhages, particularly of the nose, and of the gums after drawing teeth. It is generally used in the form of dry powder.

ALUMINUM.

Symbol Al; Atomic weight. (O=16) 27.1; Sp. gr. 2.56 to 2.68.

The metallic element Aluminum (also called Aluminium) is found combined with silicic acid and other substances in clays and shaly rock. In this form it is very abundant, also in certain double salts known as alums.

History. Aluminum was first obtained in a metallic state by Wöhler in 1828, but was known only as a laboratory product until 1858 when Deville improved the methods of producing it so that it could be manufactured for commercial purposes. About 1887 large aluminum works were established at Oldburg, England. A few years later extensive reduction works were established at Niagara Falls, N. Y., where the wonderful electric power is utilized in its production. It has, in a very few years, acquired a very important place among the metals and, owing to the abundance and wide distribution of the material from which it is produced, its importance and usefulness in the arts, and the possibilities of its application it is called the "metal of the future."

Properties. The physical properties of aluminum differ widely from those of most other metals. It is lighter than any other workable metal and may be drawn into fine wire or beaten into thin leaf as readily as gold or silver. When cast it has about the hardness of silver, but may be considerably hardened by rolling or hammering. Its tensile strength is between twelve and fourteen tons to the inch, while that of cast iron is only about eight tons; compared by weight its strength is equal to steel of thirty-eight tons tensile strength. It fuses at about 700°C . It is one of the best conductors of heat and electricity, being better than either silver or copper. It is not affected at ordinary temperatures by air, water, gases, sulphur and its compounds or the acids except hydrochloric. It is affected by strong caustic alkalies. Heated in an atmosphere of chlorine, it burns with a vivid light, producing aluminum chloride.

Uses. Aluminum is cast into ingots and rolled out into sheets of varying thickness for various purposes. It is now extensively used for culinary utensils, for jacketed steam-kettles, and for all manner of vessels and implements in which a light, non-corrosive metal is desirable. As it is capable of a high polish or a satin finish which may be printed upon, it is much used for signs, ornamental trays, calendars and many articles of art. It is cast into statuettes, used in making telescope slides, metallic parts of uniforms, dental and surgical implements, physical apparatus, harness trimmings, and innumerable other articles in place of silver, brass, nickel etc., because of its lightness and for the reason that it is not oxidized by the action of moisture, air or the ordinary gases.

It is fused with copper, iron and some of the other metals. Its addition in small proportions producing alloys of great utility. Five percent. added to copper makes an alloy closely resembling gold, much used in making cheap jewelry and ornaments. Aluminum bronze, which is an alloy of aluminum about 10 percent. with copper, is extensively used in making many useful and ornamental articles. With iron a very small proportion added lowers its melting point

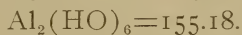
and increases the fluidity of the molten metal, causing it to run easily into the molds and set without forming blow-holes and blisters as usually occurs when not added. In the form of powder also known as "aluminum bronze," it is extensively used in painting, especially on metallic work, as radiators, steam-pipes etc., and in printing, having the appearance of silver.

The only use made of the metal in pharmacy is for making grain weights, spatulas and utensils, but its salts unite with the salts of the alkali metals, to form double salts called "alums," which are considerably used in medicine and pharmacy, and extensively used for dyeing and the manufacture of other chemicals. Besides the double salts, it forms single salts with many of the acids, the moist hydrate being readily dissolved by the acid.

The metal and its compounds are further considered in the Chemical Section in Part I.

ALUMINI HYDROXIDUM. U. S.

Aluminum Hydroxide. Hydrated Alumina.



This is a white light powder somewhat resembling magnesia, made by precipitating a saturated solution of alum with a solution of sodium carbonate; the U. S. formula is as follows:

Alum,	100 Gm. or 3½ ounces
Monohydrated Sodium Carbonate,	43 Gm. or 1½ ounces
Distilled Water,	a sufficient quantity.

"Dissolve each salt separately in 1000 Cc. (or 35 fl.ounces) of distilled water, filter the solutions and heat them to boiling, then having poured the hot solution of monohydrated sodium carbonate into a capacious vessel, gradually pour in the hot solution of alum with constant stirring and add 2000 Cc. (or 70 fl.ounces) or boiling water. Allow the precipitate to subside, decant the clear liquid, and pour upon the precipitate 2000 Cc. (or 70 fl.ounces) of hot water. Again decant, transfer the precipitate to a strainer and wash it with hot water, until the washings produce not more than a faint cloudiness with barium chloride T. S. Then allow it to drain, dry it at a temperature not exceeding 40°C. (104°F.), and reduce it to a uniform fine powder." < U. S. The 7th revision directed equal weight of alum and sodium carbonate to be dissolved, precipitated, and the precipitate washed in a similar way. The monohydrated sodium carbonate contains a less percentage of water and was chosen as a more reliable salt.

Properties and Uses. Aluminum hydroxide, or, as it is known to the market, aluminum hydrate, in its moist state, before drying, is used as a convenient basis for other aluminum salts; as acetate, chloride, nitrate, sulphate etc., which are prepared by dissolving the

moist precipitate or magma in the various acids, and crystallizing. When dried it is a white, light, tasteless powder, resembling calcined magnesia, insoluble in water or alcohol. It is an absorbent and antacid, and is given in doses of from 2 to 5 grains for irritation of the stomach etc. Externally it is used for covering inflamed surfaces, to prevent chafing etc. It is also used as an ingredient in face powders and liquid cosmetics.

Alumina. Aluminum Oxide. (Al_2O_3). This is the most abundant of the earths, the chief constituent of clay. It may be prepared by heating the hydroxide to a white heat in a covered crucible. The hydroxide and oxide of aluminum readily dissolve in acids, forming soluble salts.

Kaolin or China Clay. ($\text{Al}_2\text{O}_3\cdot\text{SiO}_2+2\text{H}_2\text{O}$). This is a hydrated silicate of aluminum oxide found in nature and used for making china-ware, crockery etc. It is sometimes used in pharmacy and medicine. It is now official in the U. S. under the title Kaolinum, which see.

ALUMINI SULPHAS. U. S. Aluminum Sulphate.



Preparation. This may be made by dissolving aluminum hydroxide to saturation in diluted sulphuric acid by the aid of heat, evaporating the solution and crystallizing or granulating by stirring until dry. A white, odorless, crystalline powder, soluble in 1 part of water at 25°C . (77°F .).

Uses. It is but little used internally, but in the form of a weak solution (1 ounce to 1 quart) is used as an astringent injection and cleansing wash for ulcers etc. A saturated solution is a powerful escharotic and astringent, and may be used for the same purposes as "burnt" alum when it cannot well be applied.

A few combinations of aluminum are better known by trade names under which they have been marketed.

Acetonal. A 10 percent. solution of aluminum and sodium acetate. It may be prepared by dissolving 82 parts of anhydrous sodium acetate in 4050 parts of solution of aluminum acetate (Ph. G.). It is employed as an antiseptic.

Aluminum Carbonate. $\text{Al}_2(\text{CO}_3)_3$. This is known by the trade name **Alcho**. It is a chalky, white, tasteless substance, recommended as an astringent and mild styptic. Its uses are similar to aluminum acetate or burnt alum. Dose internally 5 to 15 grains.

Aluminum Caseinate. Prepared by adding solution of aluminum acetate to milk freed from albumen and sterilized. It is a yellowish, tasteless, insoluble powder, recommended as an intestinal astringent. Dose 3 to 5 grains.

Aluminum Gallate. Trade name **Gallal**. A brown, insoluble powder, produced by precipitating a solution of gallic acid with a solution of alum. It is used as a drying antiseptic and astringent, chiefly externally or in the nasal passages.

Alsol. A trade name for aluminum acetotartrate. Also furnished as a 50 percent. solution.

Alsol Cream. An antiseptic ointment which may be made by combining aluminum acetotartrate 1 part with cold cream 9 parts.

Alumol. This is chemically, aluminum beta-naphthol-sulphonate, $[\text{C}_{10}\text{H}_7\cdot\text{OH}\cdot(\text{SO}_3)_2]_3\text{Al}_2$, produced by the interaction of barium beta-naphthol

disulphonate and aluminum sulphate. It is a white powder readily soluble in water or glycerin, but little soluble in alcohol. Astringent, antiseptic and styptic. Mixed with talcum it is used as a dusting powder, and in solution as an injection in gonorrhœa, leucorrhœa etc.

ALYPIN.

This has been introduced as a local anesthetic in place of cocaine hydrochloride. It is chemically, benzoyldimethylaminomethylaminobutane hydrochloride, a white, crystalline hygroscopic powder freely soluble in water and alcohol. It is employed mostly in 2 to 4 percent. solution in the same manner as cocaine, but is less toxic than it.

Alypin Nitrate. This is similar to the above but may be used with silver nitrate in solution, while the hydrochloride salt would be incompatible with it.

AMMONIUM.

Symbol NH_4 ; Atomic Weight 18.

This is a hypothetical metal, the analogue of potassium and sodium, and, although it has not been isolated as a substance, its composition is known by its characteristics in compounds, which correspond with the formula given it, NH_4 . It is not an element, but has similar properties and action as the elementary alkali metals, and for all combining purposes may be considered a univalent radical like potassium and sodium, forming salts with acids, closely resembling these elements.

It is more fully described in Part I, under the title Ammonium.

AMMONIA. Ammonium Hydrate. Ammonia Gas.

Symbol NH_3 ; Atomic Weight 16.93.

This gas is known by its peculiar odor and its property of restoring the color of litmus paper which has been changed to red by the action of an acid, to its original blue. It dissolves freely in water and forms the well known water of ammonia. It is strongly alkaline, either as a gas or in solution, and forms salts with nearly all acids.

This is more fully noticed under the heading Ammonia in Part I.

AMMONIUM SALTS.

Ammonium forms salts with nearly all the mineral and vegetable acids. They are generally colorless and very soluble in water. A few only are official in the U. S., less in the Br., and still less in the G. P. Of those unofficial in the U. S. P. but few are used in medicine or in pharmacy. The following are the official salts:

AMMONII BENZOAS. U. S., Br. Ammonium Benzoate.

$\text{NH}_4\text{C}_7\text{H}_5\text{O}_2 = 138.06$, U. S. $\text{C}_6\text{H}_5\cdot\text{COONH}_4$, Br.

"It should contain not less than 98 percent. of pure Ammonium Benzoate [$\text{C}_6\text{H}_5\cdot\text{COONH}_4$], and should be kept in well-stoppered bottles." < U. S.

"This salt is produced by neutralizing benzoic acid with solution of ammonia." < Br.

It may be prepared by the following formula which is not official:

Benzoic Acid,	1 ounce av.
Ammonia Water,	1½ fl.ounces
Distilled Water,	2 fl.ounces

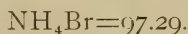
Mix the ammonia water with the distilled water and dissolve the benzoic acid in the mixture. Evaporate the solution by gentle heat, adding from time to time a little ammonia water to maintain a slight excess of alkali.

Then set aside to crystallize and dry the crystals without heat.

Uses. Ammonium Benzoate is somewhat used as a stimulant diuretic in kidney diseases. Dose, 5 to 20 grains.

Average dose.—1 Gm. (15 grains).

AMMONII BROMIDUM. U. S., Br. Ammonium Bromide.



"It should contain not less than 97 percent. of pure Ammonium Bromide, and should be kept in well-stoppered bottles." <U. S.

"This salt is formed by neutralizing hydrobromic acid with solution of ammonia." <Br.

This salt may be made by neutralizing hydrobromic acid with ammonia water, evaporating the solution and crystallizing; by decomposing potassium bromide with ammonium sulphate in the presence of alcohol, and by many other processes.

Uses. Ammonium Bromide is used as a hypnotic and sedative, and is by many preferred to potassium bromide. Dose, from 10 to 60 grains or more.

Average dose.—1 Gm. (15 grains).

AMMONII CARBONAS. U. S., Br. Ammonium Carbonate.

Sal Volatile. Hartshorn. Ammonium Sesquicarbonate.

"It should contain not less than 97 percent. of the mixture of Acid Ammonium Carbonate [$\text{CO}(\text{OH})\text{ONH}_4$] and Ammonium Carbamate [$\text{CO}(\text{NH}_2)\text{ONH}_4$], and should yield not less than 31.58 percent. of ammonia gas. It should be kept in well-stoppered bottles in a cool place. For dispensing purposes, only the translucent portions should be used." <U. S.

"A variable mixture of ammonium hydrogen carbonate, NH_4HCO_3 , with ammonium carbamate, $\text{NH}_4\text{NH}_2\text{CO}_2$, produced on heating ammonium sulphate or chloride with calcium carbonate." <Br.

As prepared for commerce, ammonium carbonate is a mixed salt, consisting of one molecule of acid ammonium carbonate and one of ammonium carbamate. It is generally prepared by subliming ammonium chloride or sulphate with chalk or calcium carbonate and re-subliming the product. It is a volatile and pungent ammonia salt—the only one having the odor of ammonia gas. Exposed to the air it soon loses the odor of ammonia and becomes inert, hence it must be carefully preserved in air-tight packages.

Uses. In pharmacy it is used in making aromatic spirit of ammonia, solution of ammonium acetate and several other preparations and in the preparation of smelling salts. In medicine it is given as a stimulant in doses of 3 to 5 grains, generally in some mucilaginous syrup. It is frequently given combined with expectorants in cough syrups. It is also employed in cleaning compounds and for culinary purposes.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

AMMONII CHLORIDUM. U. S., Br. Ammonium Chloride.

Muriate of Ammonia. Sal Ammoniac.

NH_4Cl =53.11.

"It should contain not less than 99.5 percent. of pure Ammonium Chloride." < U. S.

"This salt may be formed by neutralizing crude solution of ammonia or ammonium carbonate with hydrochloric acid, and purifying the product." < Br.

This salt is generally prepared, commercially, from ammoniacal liquid obtained from gas works, and known as "gas liquor," by neutralizing with hydrochloric acid and subliming the salt thus obtained. The sublimed salt is inconvenient for pharmaceutical use as it comes into market, but may be granulated and purified as follows:

Ammonium Chloride, in small pieces,	20 ounces
Ammonia Water,	5 fl.drachms
Water,	2 pints

Dissolve the salt in the water by the aid of heat in a porcelain vessel, add the ammonia water, and continue the heat for a short time; filter the solution while hot and evaporate to dryness, with constant stirring, at a moderate heat until it granulates.

Uses. Ammonium chloride is used as a stimulant, especially in cough mixtures, and externally in "solution" for lameness etc. The dose internally is from 2 to 10 grains.

Average dose.—0.500 Gm.=500 milligrammes, ($7\frac{1}{2}$ grains).

It is also extensively used in small batteries for telephones and electric bells, 6 ounces being the "charge" for an ordinary battery cell.

AMMONII IODIDUM. U. S. Ammonium Iodide.

NH_4I =143.83.

"It should contain not less than 97 percent. of pure Ammonium Iodide, and should be kept in small amber-colored, well-stoppered vials, protected from light." < U. S.

Preparation. This is made by decomposing a concentrated solution of potassium iodide with ammonium sulphate. Potassium sulphate remains undissolved and ammonium iodide is obtained from the filtered product by evaporation and crystallization.

Uses. Ammonium iodide is similar in its action to potassium iodide and is used for the same purposes. It is alterative and resolvent.

Average dose.—0.250 Gm.=250 milligrammes, (4 grains).

AMMONII NITRAS. Ammonium Nitrate.



This was official in the U. S. P., 7th revision, but was dismissed in the 8th.

Preparation. Ammonium nitrate may be made by adding ammonium carbonate to nitric acid as long as effervescence occurs, then filtering the solution, concentrating and crystallizing or evaporating until all the water is driven off, when it may be "granulated" by stirring until cool, or "fused" by allowing to cool without stirring.

Uses. This is sometimes used as a diuretic, but is chiefly employed for the preparation of nitrous oxide, or "laughing-gas," which is made from it simply by heating the ammonium nitrate and purifying the gas by running through a wash-bottle.

AMMONII PHOSPHAS. Br. Ammonium Phosphate.

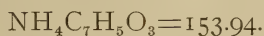


"A salt which may be obtained by neutralizing phosphoric acid with solution of ammonia." <Br.

Preparation. This may be made by adding stronger ammonia water to phosphoric acid (50 percent., 1880) until slightly in excess, then concentrating the liquid by evaporation and crystallizing. A little ammonia water should be used while evaporating to keep the solution slightly alkaline.

Uses. This is used as a remedy for rheumatism and gout in doses of from 15 to 30 grains.

AMMONII SALICYLAS. U. S. Ammonium Salicylate.



"It should contain not less than 98 percent. of pure Ammonium Salicylate $[\text{C}_6\text{H}_5(\text{OH})\text{COONH}_4]$, and should be kept in well-stoppered bottles, protected from heat and light." <U. S.

Preparation. This may be prepared by saturating a hot concentrated solution of salicylic acid with ammonia water, until a slight odor of ammonia remains, then evaporating the solution, with occasional stirring, to a powder.

It is soluble in about 1 part of water at N. T. and in 2.3 parts of alcohol at 25°C. (77°F.).

Uses. This salt of ammonium may be used to advantage in rheumatism and conditions caused by accumulation of uric acid in the

system, as it is transformed in the blood; forming with uric acid a more soluble salt, which may be eliminated by the kidneys.

Average dose.—0.250 Gm.=250 milligrammes, (4 grains).

AMMONII SULPHAS. Ammonium Sulphate.



Preparation. The common source of this salt is gas liquor or fetid bone spirit, which is saturated with sulphuric acid and the salt obtained, repeatedly crystallizing to obtain pure. It is also made by adding gas liquor to powdered calcium sulphate, which it decomposes, leaving calcium carbonate precipitated, while the ammonium sulphate remains in solution. The solution is then evaporated and crystallized.

Uses. The ammonium sulphate is used as a basis of most of the ammonium salts and as a source of ammonia gas in making ammonia water, because of its cheapness. It is not employed in medicine.

AMMONII VALERAS. U. S. Ammonium Valerate.



"It should contain not less than 98 percent. of pure Ammonium Valerate and should be kept in well-stoppered bottles." < U. S.

Preparation. This salt is prepared by passing dry gaseous ammonia into monohydrated valerianic acid. A process for making it was official in the U. S. P. 1870; but it is generally supplied by manufacturing chemists who have facilities for preparing it. It is chiefly used in pharmacy for making Elixir of Valerianate of Ammonia.

Uses. In medicine ammonium valerate is employed usually in the form of elixir or solution, in hysteria, delirium, neuralgia and nervous diseases. It is a nervine.

Average dose.—0.500 Gm.=500 milligrammes, (7½ grains).

Other Salts of Ammonium.

Besides the foregoing official salts of ammonium, a great many unofficial combinations are prepared and somewhat used. They are referred to in Part I. under the head Ammonium.

AMYL.



The radical of the Amyl series of compounds of which "fousel oil" is the hydrate, is known as **Amyl**. Its compounds form an interesting series of products, somewhat useful in medicine and considerably employed in making artificial fruit flavors. The compounds of amyl are nearly all prepared from its hydrate—amylic alcohol, ($\text{C}_5\text{H}_{11}\text{HO}$), or, as it is commercially known, fousel or fusel oil. This is combined with various acids and forms oxides or ethers.

The following are the preparations of amyl generally known and employed in pharmacy and the manufacture of fruit flavors:

Amyl Acetate,	$C_5H_{11}C_2H_5O_2$	Acetate of Amyl.
Amyl Butyrate,	$C_5H_{11}C_4H_7O_2$	Butyrate of Amyl.
Amyl Chloride,	$C_5H_{11}HCl$	Chloride of Amyl.
Amyl Formate,	$C_5H_{11}CHO_2$	Formate of Amyl.
Amyl Hydrated Oxide,	$C_5H_{11}HO$	Fusel Oil, Amyloxide.
Amyl Iodide,	$C_5H_{11}I$	Iodide of Amyl.
Amyl Nitrate,	$C_5H_{11}NO_3$	Nitrate of Amyl.
Amyl Nitrite,	$C_5H_{11}NO_2$	Nitrite of Amyl.
Amyl Valerianate,	$C_5H_{11}C_5H_9O_2$	Valerianate of Amyl.

Of the foregoing, the amyl acetate, by the resemblance of its odor to the jargonelle pear, is often called pear oil, and the valerianate, by its resemblance to the odor of apples is called apple oil. The others are variously combined to make imitation fruit flavors.

AMYL ACETATE.



This is known commercially as Pear Oil because of its resemblance to the odor of the pear. It is also called Banana Oil, but differs from the product thus named which is used as a vehicle for bronze powder in painting, that compound being a varnish mixed with fusel oil. It is chiefly used for compounding fruit ethers in imitation of the flavor of fruits.

AMYLIS NITRIS. U. S. Amyl Nitrite.

Amyl Nitris. Br. Amyl Nitrite.

"A liquid containing about 80 percent. of Amyl (chiefly Iso-amyl) Nitrite [$C_5H_{11}NO_2 = 116.24$], when assayed by the process given. It should be kept in hermetically sealed glass bulbs, or in dark amber-colored glass-stoppered vials, in a cool and dark place." <U. S.

The assay of amyl nitrite is by gasometric estimation and is fully described in the U. S. P.

"A liquid produced by the interaction of amylic alcohol which has been distilled between 262° and $270^\circ F.$ (127.7° to $132.2^\circ C.$) and nitrous acid. It consists chiefly of iso-amyl nitrite, $C_5H_{11}NO_2$, but contains also other nitrites of the homologous series." <Br.

Preparation. A volatile liquid prepared by adding to purified amylic alcohol, in a capacious glass retort, an equal volume of nitric acid, and gradually heating to near the boiling point, when the reaction will proceed spontaneously. The distillate is collected until the temperature in the retort rises to $100^\circ C.$ ($212^\circ F.$) and then discontinued. The distillate is agitated with water rendered alkaline with potassa or lime, and the oily layer that separates upon standing is then distilled, the portion coming over between $95^\circ C.$ and $100^\circ C.$ being amyl nitrite. Other amyl ethers may be made in the same manner by using other acids in place of nitric acid. This ether is soluble in all proportions in alcohol or ether, but is almost insoluble in

water. Its sp. gr. should be 0.865 to 0.875 at 25°C. (77°F.). It is very volatile and inflammable and boils at about 96° to 99°C. Upon keeping it becomes weaker and more acid, it is therefore advisable to buy it in small glass-stoppered bottles; or in pearls or tubules, in which form it will keep indefinitely.

These **pearls** or **tubules** contain 3 to 5 minims and can be crushed in a handkerchief and the vapor inhaled. It is an antispasmodic and vaso-dilator, used chiefly for headache and in asthma, dyspepsia and angina pectoris.

Average dose, internally, 0.3 Cc. (3 minims) in sweetened water or elixir.

Amyl Salicylate. This combination of amyl with salicylic acid has been marketed under the name of **Amylenal**. It is a yellowish liquid, soluble in alcohol, ether and chloroform, but insoluble in water. It is used for rheumatism by painting over the affected place, and internally in doses of 10 minims in capsules.

Amyl Valerate. A colorless liquid having the odor of apples when diluted. Soluble in alcohol, ether and chloroform; insoluble in water. It is used in flavoring compounds and has been employed with advantage for the treatment of gall-stone colic. Dose 3 to 6 minims in capsules.

AMYLENE. Pentene. Valerene.



This is prepared by distilling amylic alcohol with a concentrated solution of zinc chloride which dehydrates the alcohol. The distillate is agitated with concentrated sulphuric acid and the amylene, freed from all traces of water, rises to the surface and is collected. It is a colorless liquid, sp. gr. 0.655 at 10°C. (50°F.). Soluble in alcohol and ether, but insoluble in water. It is not now employed in medicine, but is the basis of several preparations that are used.

Amylamine Hydrochlorate. $\text{C}_5\text{H}_{13}\text{NHCl}$. This salt is given as an antipyretic in doses of from 7 to 15 grains for an adult.

Amylene Hydrate. Dimethyl Carbinol. Tertiary Amyl Alcohol. $(\text{CH}_3)_2\text{C}_2\text{H}_5\text{COH}$. A limpid, colorless liquid prepared by the action of sulphuric acid on amylene at a low temperature; separation of the amylsulphuric acid, dilution with ice cold water, filtration, neutralization with chalk or soda, and distillation. The distillate is freed from water and redistilled, the portion passing over at from 100° to 102.5°C being collected. Its sp. gr. is 0.81, and it boils at 102.5°C. It has been employed as an anodyne and hypnotic, the dose being 30 to 60 minims in ten times as much water or elixir. It is also given in doses of 3 to 5 minims, largely diluted, to children, for whooping cough.

ANESTHESIN.

This is, chemically, paraamido-benzoic acid ethyl ester. A white powder readily soluble in alcohol, ether, chloroform or oils, but little soluble in water. It is employed in medicine as a local anesthetic and is given internally as a sedative in gastric ulcer, cancer of the stomach etc. May be used in powder mixed with some inert substance, or in alcoholic or ethereal solution, or in

the form of emulsion, ointment, suppositories or bougies. Dose internally 5 to 10 grains.

Anesthesin paraphenolsulphonate. A chemical combination of anesthesin more commonly known as **Subcutin**.

ANESTHOL.

A chemical combination of ethyl chloride 17 volumes, chloroform 35.89 volumes and ether 47.1 volumes. It is recommended as a safe anesthetic for inhalation without bad after-effects. It is a colorless liquid of sp. gr. 1.045 and boiling point 104°F.

ANILINA. Aniline. Aniline Oil. Phenylamine.



This alkaloid was first obtained from indigo by dry distillation, and derives its name from **Anil**, a specie of plants from which indigo is obtained. It was afterwards obtained from coal-tar, benzene and other products of coal and petroleum distillation and is now mainly obtained from these sources. It is a colorless, oily, inflammable liquid, the base of the various well-known salts known in the market as aniline dyes. Druggists formerly had quite a sale for these aniline salts under various fanciful names, but since the introduction of proprietary package dyes, they are but little called for, but are somewhat used in pharmacy for making colors and inks. The process for obtaining aniline is complicated and varies considerably with the substance from which it is derived; therefore it is not repeated here. Aniline forms salts with most of the acids and negative elements, which give a great variety of beautiful colors known as "aniline dyes," the manufacture of which constitutes a great industry. This organic base which has been so extensively used as the basis of the aniline dyes has in the past few years been considerably employed in making medicinal compounds. The following are the more important aniline salts and compounds used as dyes and in medicine:

Aniline Oil. The oil from which aniline is obtained, consisting of aniline, toluidine, xylidine, cumidine, and small quantities of other similar bases. This oil is a common article of commerce, being used by manufacturers as a source of the aniline dyes and other chemical salts, and as a solvent for rubber and resins.

Aurin or Auramine. Rosalic Acid. $\text{C}_{19}\text{H}_{14}\text{O}_3$. An aniline derivative from which many of the aniline salts are obtained.

Azulin. A blue coloring matter formed by heating aniline with corallin.

Black Aniline, Negrosine, or Gray Aniline. This is made by acting on mauvine with strong sulphuric acid and aldehyde, and by other cheaper methods. All tints from light gray to black may be produced with this dye. It is the basis of many of the popular black tints and, combined with blue it produces the navy blue dye.

Blue Aniline. This is made both soluble and insoluble, of various shades of color. The former is known as soluble or alkali blue,

Nicholson's blue, diphenylamine blue etc.; the latter as Blue de Lyons, Blue de Nuit, blueine, Mulhouse blue, Aldehyde blue, triphenyl rosaniline etc.

Brown Aniline. This is made by heating fuchsine and formic acid together and by other methods.

Corallin, Pæonin. This is produced by heating together, at a temperature of 149°C ., rosalic acid, and an alcohol solution of ammonia gas. A red and a yellow variety are obtained by different processes.

Fuchsine, or Red Aniline, also known as Magenta, Solferino, rosaniline, roseine, rubine, and by many other similar names, is made by various processes, which consist in oxidizing aniline oil by means of acids or other oxidizing agents. It is the basis of most of the other aniline dyes.

Many modifications of the red color are produced by different combinations and processes.

Green Aniline. A variety of green shades are made by variously combining yellows and blues, or by acting upon fuchsine with various substances. They are variously known as aldehyde green, methyl-green etc.

Methylene Blue, Medicinal. Tetramethylthionine Hydrochlorate. This is official in the U. S. P. under the title Methylthioninæ Hydrochloridum, which see. It is employed as an anodyne and antiperiodic. The dose is 2 to 4 grains, 3 or 4 times a day, in capsules.

Pyoktannin. The blue pyoktannin is a mixture of the methyl-violets, the yellow is an auramine. A powder soluble in 30 parts of boiling or 75 parts of cold water, 50 parts of glycerin or 12 parts of alcohol. It is antiseptic, disinfectant and a local analgesic. It is chiefly used in surgery and as an application in diseases of the nose, throat etc. Pencils of pyoktannin are convenient for these purposes; solutions are also used.

Violet Aniline, Mauvine, Purple Aniline, etc. A great variety of violets, varying from bluish to reddish, are produced by various combinations. The most familiar are Hoffman's Violets, made by acting on fuchsine with methyl or ethyl iodide or bromide. Those having reddish shades are marked Hoffman's Violet R., while those having a blue shade are known as Hoffman's Violet B., or BB., or BBB., etc., the B's indicating the shade of blue.

Yellow Aniline and **Orange Aniline** are mostly obtained from the products of fuchsine manufacture, chrysaniline etc.

ANTIMONIUM. ANTIMONY.

Symbol, Sb., (Stibium); Atomic weight, 119.2; Sp. gr., 6.715.

The metal Antimony occurs in nature to a small extent but is generally found alloyed or associated with other metals or combined with sulphur. The common commercial source being sulphide of

antimony, gray antimony, or stibnite (Sb_2S_3). This ore was called by the alchemists **lupus metallorum**, and metallic Antimony was named by them, **regulus**, or regulus of Antimony

Metallic Antimony is a bright, silver-gray metal very brittle, easily pulverized, and is one of the most important alloy-metals we possess. Its salts are considerably used in pharmacy and medicine.

The alloys of this metal and its chemical salts are referred to in the chemical section, Part I, but the salts used in medicine are further described here.

The following are the salts official in the U. S. and Br. P:

ANTIMONII ET POTASSII TARTRAS. U. S.

Antimony and Potassium Tartrate. Tartar Emetic, U. S.

Antimonium Tartaratum. Tartarated Antimony, Br.

$2\text{K}(\text{SbO})\text{C}_4\text{H}_4\text{O}_6 + \text{H}_2\text{O} = 659.80$, U. S. $[\text{K}(\text{SbO})\text{C}_4\text{H}_4\text{O}_6] \cdot \text{H}_2\text{O}$, Br.

"It should contain not less than 99.5 percent. of pure Antimony and Potassium Tartrate." < U. S.

Preparation. This salt is the most important medicinal preparation of antimony. It may be made by the old official process, which is as follows:

Antimony Oxide, in very fine powder,	2 ounces
Potassium Bitartrate, in very fine powder,	2½ ounces
Distilled Water,	18 ounces

To the water, heated to boiling in a glass (or porcelain) vessel, add the powders previously mixed and boil for an hour. Then filter the liquid while hot, and set aside that crystals may form. Lastly, dry the crystals and keep them in a well-stoppered bottle.

Average dose.—Expectorant, 0.005 Gm.=5 milligrammes, ($\frac{1}{10}$ grain). Emetic, 0.030 Gm.=30 milligrammes, ($\frac{1}{2}$ grain).

The British process is similar, except that the powders are first mixed together, moistened with water to a pasty mass and allowed to stand twenty-four hours before boiling with the remainder of the water, the boiling being continued only 15 minutes.

This salt is found in the market generally in the form of a white powder familiarly known as Tartar Emetic. It is soluble in about 17 parts of cold, or 3 parts of boiling water.

Uses. Tartar emetic is given in doses of from $\frac{1}{2}$ to 1 grain, repeated if necessary, as an emetic. In doses of one-fortieth to one-third grain it is used as a diaphoretic and alterative. It is much prescribed and used as an astringent in cough medicines, and is also used for making irritating ointments and plasters.

Antidote. For poisoning by overdose of this salt, some solution containing tannin should be freely given. Strong tea will do. Tannin forms with it an insoluble salt.

ANTIMONII OXIDUM. Br. Antimonious Oxide.**Antimony Trioxide. Antimony Oxide.**

"Antimonious Oxide, Sb_4O_6 , may be prepared by pouring solution of antimonious chloride into water, and decomposing the precipitated antimony oxychloride with sodium carbonate." < Br.

Preparation. This is trioxide of antimony or antimonious oxide. It may be made by treating antimony sulphide with hydrochloric acid, by the aid of heat, then adding nitric acid and water, and filtering, which makes a solution of chloride of antimony. The filtrate is then poured into a large quantity of water, which precipitates antimony oxychloride. To convert this into oxide it is treated with ammonia water for two hours, and then washed with distilled water to remove ammonium chloride.

Uses. This is chiefly used for preparing tartarated antimony of the Br. P. It should dissolve entirely when treated with an excess of acid potassium tartrate.

Dose.—1 to 2 grains.

ANTIMONII SULPHIDUM.**Antimony Trisulphide. Antimony Sulphide or Sulphuret.**

This was official in the 7th revision of the U. S. P., but was dismissed from the 8th. It is like Antimonium Nigrum Purificatum, except that the latter is purified.

It is the commercial or crude Sulphuret of Antimony, from which the other antimonial preparations are chiefly derived. It is considerably known as an ingredient of condition powders, and is known in the market as "medleys."

ANTIMONIUM NIGRUM PURIFICATUM. Br.**Purified Antimony Sulphide. Antimonious Sulphide, Br.****Black Antimony.**

"Native Antimonious Sulphide, Sb_2S_3 , from which the silicious matter has been removed by fusion, reduced to a fine powder, and, if any salt of arsenicum be present, purified by digesting with half its weight of ammonia for several days, washing and drying." < Br.

This is the same as the foregoing except that it purified by dissolving out whatever arsenous sulphide is present, with ammonia.

Antimony Sulphide, 100 Gm. or 16 ounces av.

Ammonia Water, 50 Cc. or $8\frac{1}{2}$ fl.ounces

Water, a sufficient quantity.

Reduce the sulphide to a fine powder; add the ammonia water, macerate for five days with frequent agitation; then pour off the ammonia water. Wash the residue thoroughly with several portions of water, and, finally, dry by heat.

Uses. Whenever sulphide of antimony is directed to be used in medicine, the preparation thus purified should be employed. It is considerably used in making horse and cattle powders.

ANTIMONIUM SULPHURATUM. Br.

Sulphurated Antimony. Kermes Mineral.

"A mixture containing antimony sulphides and oxides and sulphur."
<Br.

Antimonious Sulphide,	200 Gm. or 10 ounces
Sublimed Sulphur,	200 Gm. or 10 ounces
Caustic Soda of commerce,	100 Gm. or 5 ounces
Diluted Sulphuric Acid,	
Distilled Water, of each a sufficient quantity.	

Dissolve the caustic soda in 2000 Cc. or 100 ounces of the distilled water; with the solution mix the antimonious sulphide and the sulphur; boil for two hours with frequent stirring and addition of sufficient water to make up for evaporation; then, while still hot, add 3600 Cc. or 180 ounces of boiling distilled water; strain the product through calico; before the strained liquid cools, add to it, by degrees, diluted sulphuric acid until it is in slight excess; collect the precipitate on a calico filter; wash with distilled water till the washings are free from sulphates; dry at a temperature not exceeding 212°F. (100°C.). Br.

Uses. This is given as an alterative and diaphoretic in small doses and an emetic in doses of from 1 to 2 grains. It is an ingredient of the well-known Plummer's Pills, which are official.

ANTIPYRINA. U. S. Antipyrine.

Phenazonum. Br. Phenazone.



"Phenyldimethylpyrazolon [$\text{C}_3\text{HN}_2\text{O}(\text{CH}_3)_2\cdot\text{C}_6\text{H}_5$], obtained by the condensation of phenylhydrazine with aceto-acetic ether, and methylation of the product." <U. S.

It is a colorless, nearly odorless, crystalline powder or tabular crystals, with a slightly bitter taste. Soluble in less than 1 part of water, 1 part of alcohol or chloroform, and 30 parts of ether.

Properties. This is one of the first of the proprietary antipyretics introduced. Knorr obtained a patent for producing it by the interaction of phenyl-hydrazine and acetyl-acetic acid, by which phenyl-hydrazine acetylacetate is first formed, which by the action of heat, is split up into ethyl alcohol and phenyl-methyl-pyrazolon. Methyl iodide is introduced then, producing by the reaction, antipyrine hydroxide. Messers Lucius & Brüning, of Höchst on the Rhine, make this preparation after a patented process, by heating methyl-oxychinizin with an excess of phenyl-hydrazin to boiling, and collecting

the white, crystalline powder which forms. Many other methods of producing it have been used but all are complicated chemical processes which will seldom be attempted outside of the manufacturer's chemical laboratory.

Uses. It is the most freely soluble of any of the antipyretics and can therefore, be used in liquid preparations which do not admit of other, like remedies. It is, however, expensive, and the dose being double that of other antipyretics, restricts its use somewhat. It is given as an antipyretic to reduce the temperature, in fevers, la grippe etc., and for pains, sleeplessness, headache etc.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

Antipyrine Combinations.

Antipyrine forms compounds with several of the organic acids which are considered valuable in medicine. A few of the combinations are as follows:

Antipyrine Amygdalate. *Tussol.* A combination of antipyrine with amygdalin. A crystalline substance soluble in water, decomposed by alkalis. It is used as a remedy for whooping-cough and an infantile analgesic. Dose for adults, 0.50 to 4 Gm. (7½ to 60 grains), children according to age, from ½ to 10 grains.

Antipyrine Benzoate. This may be prepared by the addition of antipyrine to a boiling solution of benzoic acid. Upon cooling the salt crystallizes.

Antipyrine Chloral. *Hypnal.* A combination of equivalent parts of antipyrine and chloral. A crystalline product, melting at 68°C. Soluble in 15 parts of water; more soluble in alcohol.

It is given as a hypnotic and analgesic without the disagreeable and irritant taste of chloral, and having a more benificent action.

Dose, 1 Gm. (15 grains), in cachets, capsules, syrup or elixir.

Antipyrine Citrate. By adding antipyrine to a boiling solution of citric acid and allowing to crystallize.

Antipyrine Ferrated. *Ferropyrine.* A chemical compound of antipyrine with chloride of iron. A red crystalline powder soluble in 5 parts of water. It is astringent without being caustic and has the tonic action of iron. Dose, 0.50 to 0.15 Gm. (¾ to 2 grains).

Antipyrine Iodide. *Iodopyrine.* Iodoantipyrine. A chemical combination of antipyrine and iodine. It is in colorless needle-shaped crystals; but little soluble in cold, but soluble in hot water and in alcohol. It is antithermic, analgesic and anti-neuralgic, useful in rheumatic fever and as a resolvent. Dose, 0.50 to 1 Gm. per day, in powders or cachets.

It is also useful as an ingredient in solutions for application to skin diseases, and in the form of ointment or other unctuous preparations. In combination with other powders it is used as an antiseptic dusting; also for coryza in the form of snuff.

Antipyrine Picrate or Carbazoate. By adding antipyrine to a boiling solution of picric acid and allowing to crystallize.

Antipyrine Salicylate. Salipyrine. This is official in the 1900 P. G. under the title "Pyrazolinum phenyldimethylicum salicylicum, salicylsäures phenyldimethylpyrazolon." Also in the French Codex under the title "salicylate d'analgésine." It may be produced by heating together in molecular proportions antipyrine and salicylic acid to 100°C. (212°F.). This salt has been considerably used as a remedy for rheumatism and similar affections. The dose is from 10 to 15 grains (0.75 to 1 Gm.), every two hours or oftener until 120 grains have been given.

Antipyrin-Salol. This is prepared by melting together equal parts of antipyrin and salol. It is a brownish liquid and is used chiefly as a hemostatic in uterine or nasal hemorrhage, applied on tampons.

Antipyrine Tannate. This may be prepared by heating together on a water-bath at a temperature of 100°C., equal parts of antipyrine and tannic acid.

This is also known to the trade as **Tannipyrin**. It is employed as a sedative and astringent and is used for nasal hemorrhage, hemorrhoids etc., as a styptic application.

Other compounds of antipyrine will be noted under other headings.

RECENT PROPRIETARY "ANTI—" PREPARATIONS.

Antikamnia. A proprietary compound by this name is put up by the Antikamnia Chemical Co., of St. Louis, Mo., and has been extensively sold as an anodyne and analgesic. The word "Antikamnia" is proprietary, and druggists are not allowed to use it for preparations of their own make.

According to the published statement on the label Antikamnia tablets now contain 305 grains of acetphenetidin, U. S. P., per ounce.

This is a valuable antipyretic and analgesic. Dose 5 to 15 grains. The tablets are a very convenient form for exhibiting this medicine.

Antinervine. Salicylbromanilid. This has been introduced as a proprietary preparation. A similar compound may be made as follows:

Acetanilide,	2 ounces
Salicylic Acid,	1 ounce
Ammonium Bromide,	1 ounce

Rub them together to a fine powder. The dose is 5 to 10 grains, for neuralgia, pain and nervous irritability.

Antinosin. Tetra-iodo-phenolphthaleate of Soda. A blue powder soluble in water. It is used chiefly as an antiseptic in the preparation of solutions intended for injections into cavities of the body, as a destroyer of microbes. A solution of from 1 to 3 percent. is used.

Antisepsin. Mono or Para-bromacetanilid. This was introduced

after acetanilide became popular, but has never met with much favor. It is supposed to be a bromine combination of acetanilide. A preparation may be made to fill its place as follows:

Salicylic Acid,	½ ounce
Ammonium Bromide,	1 ounce
Acetanilide,	1 ounce

Rub them together to a fine powder. Dose 5 to 10 grains for headache.

Antisclerosin. A compound of sodium chloride, sulphate, carbonate and phosphate, calcium glycerinophosphate, and magnesium phosphate, mixed in the same proportions as is found in blood serum.

Tablets are prepared, each tablet representing the equivalent of 75°C. blood serum. They are intended to act as reconstructive in arterial sclerosis. Dose, 2 tablets taken with meals.

Antiseptol. This is recommended as a substitute for iodoform and, according to Yvon, may be prepared as follows:

Cinchonine sulphate, 2½ ounces, is dissolved in 200 ounces of water; a solution of iodine is prepared with iodine and potassium iodide, each 1 ounce, in 100 ounces of water. The iodine solution is then added to the cinchonine solution so long as a precipitate is formed, care being taken to avoid excess. The precipitate is then collected and washed on a filter with water, until all traces of free iodine are removed, then dried in the air.

This may be used for the same purposes as iodoform, either as a dusting or in the form of solution or ointment.

Antispasmin. A compound of narceine with sodium salicylate containing 50 percent. of each. A mixture of equal parts of the drugs named may be made by rubbing them together. It is prescribed as a hypnotic and analgesic for cramps and spasms. Dose, ½ to 1 grain, repeated until relief is obtained.

Antithermin. This is a compound obtained by the action of phenylhydrazin upon acetopropionic acid. It forms colorless crystals, soluble in ether and alcohol, but insoluble in cold water. Its action is similar to antifebrine, reducing the temperature and depressing the nervous system. The dose is 5 to 10 grains.

ANTITOXINS.

Antitoxins are defensive proteids occurring in serum or lymph, obtained from animals that have been inoculated with a prepared, much diluted virus, of the same nature as is found in persons affected with the disease which it is intended to combat.

The antitoxins are produced by making successive cultures of the virus, which is each time diluted or weakened.

The antitoxin is used by inoculation or injection with the intention to produce the disease in a mild form and serve as a prophylactic; giv-

ing immunity to the patient against the more violent form of the disease.

As these are mostly **Serums** they will be described under that title.

APOCODEINE HYDROCHLORIDE.



This is prepared from codeine in a manner similar to that described under apomorphine hydrochloride, following. It is a hygroscopic powder of a greenish-gray color, readily soluble in water. Its properties are similar to cocaine and it is used as a sedative but more particularly as an expectorant in chronic bronchitis. It has, also, been proven a laxative when administered hypodermically in doses of 30 to 40 minims of a 1 percent. solution. The dose of the powder is $\frac{1}{8}$ to 1 grain.

APOMORPHINÆ HYDROCHLORIDUM. U. S., Br.

Apomorphine Hydrochloride.



"The hydrochloride [$\text{HCIC}_{17}\text{H}_{17}\text{NO}_2$] of an alkaloid prepared from morphine by the abstraction of one molecule of water. It should be kept in small, dark amber-colored vials, which have been previously rinsed with diluted hydrochloric acid and dried." < U. S.

"The hydrochloride of an alkaloid obtained by heating morphine hydrochloride or codeine hydrochloride in sealed tubes with hydrochloric acid." < Br.

Preparation. This may be prepared by heating one part of morphine with 20 parts of hydrochloric acid in a strong glass or metal tube at least fifteen times the capacity of the substances introduced. The tube must be securely sealed and the heat is best regulated by means of an air-bath by which it can be maintained for three hours at a temperature of 140° to 150°C . (284° to 302°F .). After heating in this manner the tube is cooled and its contents dissolved in water; sodium bicarbonate in excess is then added and when the precipitate has subsided the liquid is poured off and the precipitate is shaken with successive portions of ether which dissolves the apomorphine. A few drops of hydrochloric acid are then added to the ethereal washings and, after standing, crystals of morphine hydrochloride are found, (the acid uniting with the morphine and separating from the ether because the salt is insoluble in ethers). The crystals are then dissolved in boiling water and recrystallized, making the pure morphine hydrochloride which is employed in medicine. It is soluble in about 45 parts of water and in alcohol.

Uses. This alkaloidal salt has come into general favor as a prompt emetic by hypodermic injection. It is also used extensively by the various institutes for the cure of inebriates. It does not possess narcotic principles, like most of the alkaloidal salts of opium.

Average dose.—Expectorant, 0.002 Gm.=2 milligrammes ($\frac{1}{30}$ grain). Emetic, 0.005 Gm.=5 milligrammes ($\frac{1}{10}$ grain).

AQUÆ. U. S. Waters.

Aquæ Medicatæ. Medicated Waters. Aromatic Waters.

As applied to pharmacy in this country and Great Britain the term Aquæ or Waters includes only aqueous solutions of aromatic or volatile substances, either with or without the aid of some insoluble medium by means of which their solution may be facilitated.

These waters are more commonly called "medicated waters;" but with one or two exceptions, they are hardly entitled to that appellation. They are used in pharmacy for making a few medicinal preparations and in medicine are prescribed as vehicles for more active remedies.

The U. S. P. includes in the waters, aqua ammoniæ and aqua hydrogenii dioxidi, which are solutions of gas in water; the Br. P. includes ammonia water among the solutions, which is, no doubt, the more proper classification. In Germany pharmacy several preparations are classed among the waters that more properly belong to the solutions; and in French pharmacy, a large number of preparations are included in the "Eaux" which should more properly be in entirely different departments. In Spanish pharmacy Aqua Régia, (nitro-hydrochloric acid) is classed among the waters; and in most of the foreign pharmacopœias many preparations are included among the waters, which are not known as such in this country and Great Britain.

The various processes by which waters are prepared are as follows:

By Simple Solution.

a. Of those made with cold water, the solutions of gaseous ammonia, chlorine and hydrogen dioxide; of chloroform, carbolic acid and creosote; of bitter almond oil, and tar and various solutions of salts in waters may be mentioned. With the exception of the gaseous solutions, which require special apparatus, the remaining waters are made simply by agitating the substances occasionally for several days with cold water.

b. Hot water dissolves the volatile oils much more readily than cold, and very good waters may be made by thoroughly agitating the volatile oil directly in hot water, allowing to stand for several hours, and filtering. Nearly all the waters in which volatile oils are used can be satisfactorily made in this manner.

Aromatic waters may be made extemporaneously by agitating one part of the essential oil with 999 parts of water.

By Distillation.

a. From fresh or dried herbs, aromatic fruit, flowers, leaves, bark, root, wood or other parts of plants. The substance is introduced with

water into a still and more or less of the water (which is charged with the volatile constituents of the substance) is distilled over. Or steam is passed through the substances contained in a still, the vapor condensed, and when cold, the oily particles removed with a pipette, or by filtration. French pharmacy waters prepared by distillation are called **hydrolats**.

b. From essential oils of plants, by mixing them with a quantity of sand or some substance to separate the oily particles, then adding water and distilling over about half the quantity used. The proportion is generally about one fl.drachm of essential oil, 4 ounces of sand, and one gallon of water. Distil 4 to 6 pints. This is a very good way to make distilled waters. They generally keep better than when made from the fruit, flowers, leaves etc.

Distillation, whenever it is admissible, is to be recommended above all other processes for the preparation of waters. The process and apparatus are further described in the article on Distillation. When made by distillation, the distilled waters while still warm should be put up in small, well-filled bottles, sealed, and put in a cool place. They will then keep for years.

By Filtration or Percolation.

The process at one time official for making most of the waters of the U. S. P. was to rub 30 minims of the essential oil with 60 grains of magnesium carbonate, then with 2 pints of water, and filter. This was generally a very satisfactory process, but it was thought desirable to change the process in the 1880 revision by substituting cotton as a means of mechanically subdividing the oil to aid in its solution; 30 minims of the essential oil was added to 60 grains of absorbent cotton and evenly distributed by working them together. The saturated cotton was then to be packed loosely in the neck of a funnel and water percolated through it until two pints had passed. The use of cotton was not, however, entirely satisfactory.

Mr. John D. Benedict, in *The Formulary*, for Jan. 1889, suggested the following manner of making the medicated waters prepared from essential oils etc. It is a very simple method and make quite satisfactory preparations:

Take a medium sized filter paper, fold it, then drop the pharmacopœial amount of oil on the paper near the point of the filter, when in a folded condition, and allow it to partly dry. Enclose this filter in a second one of the same size (or larger, if desired), and place it in the funnel; then pass the water through the double filters, returning it two or three times, or until you are satisfied that the water has taken up all the oil that it will.

For camphor water, wet the filter thoroughly with U. S. P. spirit of camphor and allow the alcohol to evaporate; then enclose in a second filter and proceed as outlined for other waters.

"The results I have obtained from this method of manipulation have been all that could be asked for in point of stability, clearness, aroma and rapidity."

The 1890 U. S. P. directed many of the waters to be prepared by rubbing the essential oil with dry precipitated calcium phosphate in a mortar, and gradually adding, with constant trituration, the required quantity of water, then filtering and adding through the filter enough water to make the required measure. Other substances besides precipitated calcium phosphate may be used,—as magnesium carbonate, precipitated chalk, powdered kaolin, powdered pumice stone or other insoluble absorbent material, the object being to break up the oil globules into a state of fine division that they may be more readily dissolved by the water.

As an improvement upon the U. S. P. process, hot water instead of cold may be used, the trituration being conducted in the same manner, and the solution allowed to stand covered until cold before it is filtered. The hot water greatly facilitates the solution of the essential oils and stronger flavored waters are obtained.

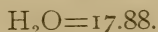
Another convenient way to prepare waters from essential oils is to take 30 minims of the essential oil, dissolve it in $\frac{1}{2}$ ounce of alcohol and put the solution into a quart bottle; add 2 drachms calcined magnesia and 32 ounces of water, shake well, allow to stand an hour or more and filter.

The general instructions of the present U. S. P. are as follows:

AQUÆ. U. S. Waters. Medicated Waters.

"The medicated waters, when prepared from volatile oils, are intended to be, as nearly as practicable, saturated solutions, which must be clear and free from solid impurities. In the processes which follow, the solution of volatile oils is facilitated by the use of purified talc; but the solution may, if preferred, be aided by replacing the purified talc by pulped or shredded filter paper; waters may also be made by the addition of volatile oils to hot water and separation of the excess of the former, or by the distillation of the drug or volatile oil with water, if by either of these methods the finished product corresponds in all respects with official requirements." <U. S. Eighth revision.

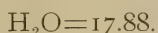
AQUA. U. S., Br. Water.



"Potable Water in its purest attainable state." <U. S.

The pharmacopœia directs certain tests for determining the purity of water; but where it is not known to be reasonably pure, distilled water should be used for chemical and pharmaceutical purposes and operations.

Rain water and melted ice, boiled and filtered, are reasonably pure.

AQUA DESTILLATA. U. S., Br. Distilled Water.

The U. S. P. directs:

"Water, one thousand volumes,	1000 vol.
To make eight hundred volumes,	800 vol.

Distil the water from a suitable apparatus provided with a block-tin or glass condenser. Collect the first one hundred (100) volumes and reject this portion. Then collect eight hundred (800) volumes and keep the distilled water in glass-stoppered bottles which have been rinsed with hot distilled water immediately before being filled." <U. S.

Distilled water boils at 100°C. (212°F.), with the barometer at 30 inches, and expands into 1700 times its bulk when converted into steam. It congeals at 0°C. (32°F.), and attains its greatest density at 4°C. (39.2°F.), from which temperature its volume is calculated as a basis for standard fluid measures. It is the basis from which the specific gravity of liquids and solids is calculated, the weight of a given volume at a specified temperature being generally taken as the unit 1, 1.00, 1.000, or 1.0000.

The pharmacopœias of all countries recognize distilled water and direct it in many of their preparations. Tests of purity are directed in the U. S. and Br. P. and in many others.

It is used in many of the formulas and operations of chemistry, and as a solvent and diluent whenever water free from all impurities is required.

Mr. William P. Mason of the Rensselaer Polytechnic Institute of Troy, N. Y., has investigated the weight of the U. S. gallon of 231 cubic inches of water, and after careful and exhaustive calculations finds "the U. S. gallon of distilled water at 60°F., weighed in air at 60°F., with barometer at 30 inches weighs 58334.946 grains." This differs slightly from some of the authoritative determinations, but may be considered correct.

AQUA AMMONIÆ. U. S. Ammonia Water.

"An aqueous solution of Ammonia [$\text{NH}_3=16.93$], containing 10 percent., by weight, of gaseous ammonia." <U. S. Sp. gr. 0.958 at 25°C. (77°F.); volatilizes completely at 100°C. (212°F.).

All other pharmacopœias class this under solutions. (See Ammonia and Liquor Ammonia).

The present pharmacopœia gives no formula for preparing this water. The process of the 1870 U. S. P. was to mix muriate of ammonia (ammonium chloride) in small pieces with milk of lime in a retort connected with a cooled receiver by means of a glass tube extending beneath the surface of distilled water contained in the receiver. Heat being then applied, the lime is converted into chloride of lime,

liberating the ammonia gas which is distilled over and dissolves in the water contained in the receiver.

The official strength of the U. S., Br. and German water, liquor or solution of ammonia, is 10 percent., by weight, of the gas. Its sp. gr. is 0.960. In German pharmacy it is generally prescribed by its Latin name, "Liquor Ammonii Caustici."

It is supplied by manufacturers in carboys, and marked by some 16° and by others F.F.F., or 3F. Other manufacturers mark the 20° ammonia F.F.F., or 3F., so it will be seen that considerable confusion exists in regard to the F's, and they should never be taken as the standard of strength of the solution, the degree marks, only, being reliable.

In pharmacy both the 10 percent. and the stronger solutions are used in making the official preparations, and in general use other strengths are employed; for druggists buy of manufacturing chemists water of ammonia varying all the way from 6 to 28 percent. or more of the gas—the most frequently sold being the "F.F.F." or 20° Baumé, sp. gr. 0.933, containing 17½ percent. of gas. To reduce the 20° or "F.F.F." ammonia to the official 10 percent. ammonia water, mix 16 ounces av. with 12 ounces av. of distilled water.

To reduce the 28 percent., or stronger ammonia water to the 10 percent. strength, mix 16 ounces av. with 28¼ ounces av. of distilled water.

Uses. In the industrial arts, in ice machines and in manufacturing chemicals, ammonia is extensively used, either in the form of gas, solution or salts. The domestic use of "household ammonia" has greatly increased within the past few years. In medicine, water of ammonia is used externally as an application in the form of liniments, mixtures etc., as a stimulant and counter-irritant for rheumatism, neuralgia, lameness etc. Internally it is given as an antacid and stimulant, in doses of from 5 to 30 drops.

Average dose.—U. S. 1 Cc. (15 minims). It should be much diluted for internal administration.

AQUA AMMONIÆ FORTIOR. U. S.

Stronger Ammonia Water.

"An aqueous solution of ammonia [$\text{NH}_3=16.93$] containing 28 percent., by weight, of gaseous ammonia. This solution deteriorates on keeping, and should be tested frequently. Stronger ammonia water should be kept in partially filled, strong glass-stoppered bottles in a cool place. Great caution should be used in handling this liquid." <U. S.

The U. S. official Stronger Ammonia Water contains 28 percent. of ammonia gas, by weight, sp. gr. at 25°C. (77°F.) 0.897, and is marked 26°. The Br. Strong Solution of Ammonia contains 32.5 per-

cent. of the gas, by weight, sp. gr. at N. T. 0.891. There is no corresponding official German solution.

It is prepared in the same manner as the 10 percent. solution, except that a greater percentage of gas is dissolved in the water.

Stronger water of ammonia is frequently employed as a vesicant and caustic, but is seldom given internally.

AQUA AMYGDALÆ AMARÆ. U. S. Bitter Almond Water.

The U. S. P. formula is

“Oil of Bitter Almond,

1 Cc. or 15 minims

Distilled Water,

999 Cc. or 32 fl.ounces

Dissolve the oil in the distilled water by agitation, and filter through a well wetted filter.” < U. S.

Average dose.—4 Cc. (1 fl.drachm).

Bitter almond water is not official in the Br. P. or the Fr. Codex. Cherry-Laurel water being used instead. (See Aqua Laurocerasi).

AQUA ANETHI. Br. Dill Water.

This is official only in the Br. P., the formula being

Dill fruit 1 pound av. (or 500 grammes), water 2 Imperial gallons (or 10 liters). Distil one-half.

This water is considerably used in Great Britain but is seldom called for in this country.

AQUA ANISI U. S., Br. Anise Water.

The U. S. formula is: Oil of anise 2 Cc. (or 30 minims), purified talc 15 grammes (or ½ ounce), distilled water, sufficient to make 1000 Cc. (or 32 fl.ounces).

Triturate the oil of anise with the purified talc, add the water gradually, triturate and filter. < U. S.

The Br. Ph. formula is: Anise fruit 1 pound av. (or 500 grammes), water 2 gallons, (or 10 liters). Distil one-half. < Br.

Average dose. U. S. 16 Cc. (4 fl.drachms).

AQUA AURANTII FLORUM. U. S. Orange Flower Water.

The U. S. P. directs

Stronger Orange Flower Water,

Distilled Water, of each one volume.

Mix them immediately before use.

The **Stronger Orange Flower Water** directed to be used is what is known as triple orange flower water, which is prepared by distillation, and is the saturated aqueous residue which occurs in the distillation of orange flowers in making oil of neroli. The otto being removed from the surface of the distillate leaves a strongly-flavored water, which is known in commerce as orange flower water, **triple**.

It is generally prepared in the south of France, from whence it is exported.

AQUA AURANTII FLORUM FORTIER. U. S.

Stronger Orange Flower Water. Triple Orange Flower Water.

Aqua Aurantii Floris. Br. Orange Flower Water.

"Water saturated with the volatile oil of fresh orange flowers, obtained as a by-product in the distillation of the oil of orange flower. It should be kept in loosely-stoppered bottles in a dark place." <U. S.

The Br. P. under the Latin title, **Aqua Aurantii Floris**, describes it as "The Orange Flower Water of commerce, prepared from the flowers of the Bitter Orange tree, *Citrus Aurantium*." <Br.

This corresponds more nearly to the orange flower water of the other pharmacopœias than with the preparation bearing that name of the present U. S. P. (See above).

Stronger or triple orange flower water is used in making several official preparations and for flavoring many of the "Elegant preparations" of pharmacy.

AQUA CAMPHORÆ. U. S., Br. Camphor Water.

The U. S. formula is

Camphor,	8 Gm. or 120	grains
Alcohol,	8 Cc. or 120	minims
Purified Talc,	15 Gm. or ½	ounce
Distilled Water, to make	1000 Cc. or 32	fl.ounces

The camphor is to be dissolved in the alcohol, the purified talc added with trituration and, after allowing the greater part of the alcohol to evaporate spontaneously, water is gradually added with trituration, to make 1000 Cc. The mixture is then to be filtered.

The Br. formula is

Camphor,	70 grains	or 5 grammes
Alcohol, (90%), a sufficient quantity,		
Distilled Water,	160 fl.ounces	or 5 liters

Dissolve the camphor in a sufficient quantity of the alcohol to form a flounce (or 15 Cc.) of the solution; add this in successive portions to the distilled water, shaking after each addition; finally agitate occasionally until all the camphor is dissolved.

Camphor water is used chiefly as a vehicle for other medicines. It has a slightly sedative effect and may be given one half to one flounce every two hours.

Average dose.—8 Cc. (2 fl.drachms).

AQUA CALCIS. AQUA CALCARIÆ. Ph. Ger. Kalkwasser.

Lime Water. Solution of Lime.

This is official either as Lime Water or Solution of Lime in all pharmacopœias. As it is simply a saturated solution of calcium hydrate

the formulas must all produce the same; therefore the Ph. Ger. formula, which is a representative of all, is given.

Lime,	1 part
to be slacked with	
Water,	4 parts
then mixed by stirring it with	
Water,	50 parts

After standing a few hours pour off the liquor and throw it away; add to the residue

Water,	50 parts
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and mix them thoroughly. Set aside and pour off the liquid from the top as wanted, or filter.

Solution of lime or lime water is a saturated solution, containing all the lime that will dissolve; an excess of lime is used and, if kept with the sediment in the bottle, fresh water may be added from time to time, the bottle shaken, and it will be the same as before.

Uses. It is used in pharmacy in some liniments and lotions where a mild alkali is desired, and internally is much employed as an antacid, and is mixed with milk given to invalids and infants. A teaspoonful to a tablespoonful is the ordinary dose.

AQUA CARUI. Br. Caraway Water.

The Br. formula is

Caraway Fruit,	1 pound or 500 grammes
Water,	320 fl.ounces or 10 liters

Distil one-half. It may also be made from caraway oil, 15 minims in a pint, in the same manner as other waters made from oils. This is a pleasant aromatic water, like anise water, and is used as a vehicle.

AQUA CHLOROFORMI. U. S., Br. Chloroform Water.

The U. S. formula is

Chloroform, Distilled Water, each, a sufficient quantity.

"Add enough chloroform to a convenient quantity of distilled water contained in a dark amber-colored bottle to maintain a slight excess of the former, after the contents have been repeatedly and thoroughly agitated.

When chloroform water is required for use, pour off the needed quantity of the solution, refill the bottle with distilled water and saturate it by thorough agitation, taking care that there is always an excess of chloroform present." < U. S. Contains $\frac{1}{2}$ percent. of chloroform.

Average dose.—16 Cc. (4 fl.drachms).

The Br. P. formula is

Chloroform,	30 minims or $2\frac{1}{2}$ Cc.
Distilled Water, to make	25 fl.ounces or 1000 Cc.

Shake them together until the chloroform is dissolved.

(A note to this formula says: "This preparation contains only half the proportion of chloroform present in the corresponding preparations of the Br. P. 1885)."

This water is a simple saturated solution of chloroform in water, the chloroform being heavier than water subsides after agitation, leaving only that which remains in solution in the water, as chloroform water. A fl.drachm of chloroform requires 25 fl.ounces of water to effect its solution. Chloroform water contains, therefore, one-half of one percent. of chloroform. It has proven an excellent vehicle for the administration of medicines. The dose is from $\frac{1}{2}$ to 2 fl.ounces (15 to 60 Cc.).

AQUA CINNAMOMI. U. S., Br. Cinnamon Water.

The U. S. P. directs this to be prepared from cinnamon oil as follows:

"Oil of Cinnamon,	2 Cc. or 30 minims
Purified Talc,	15 Gm. or $\frac{1}{2}$ ounce av.
Distilled Water, to make	1000 Cc. or 32 fl.ounces

Triturate the oil of cinnamon with the purified talc, add the distilled water gradually, with continued trituration, filter, and pass the filtrates through the filter repeatedly until the cinnamon water is perfectly clear." <U. S.

The Br. P. directs

Cinnamon bark, bruised,	1 pound or 500 grammes
Water,	320 fl.ounces or 10 liters

Distil one-half.

It may also be made by mixing 1 fl.drachm of cinnamon oil with 4 ounces of sand and 8 pints of water and distilling 4 pints. This produces a superior cinnamon water.

Cinnamon water is a pleasant aromatic stimulant, much used and prescribed as a vehicle and dilutant for more active medicines. The dose is 2 to 4 fl.drachms (7 to 14 Cc.).

AQUA CREOSOTI. U. S. Creosote Water.

The U. S. P. directs

Creosote,	10 Cc. or 1 fl.drachm
Distilled Water,	990 Cc. or 12 $\frac{3}{8}$ fl.ounces

"Agitate the creosote vigorously with the distilled water, and filter through a well-wetted filter." <U. S. Contains 1 percent. of creosote.

Creosote water is administered internally, the U. S. preparation as an antiseptic in doses of from 1 to 4 fl.drachms (3.70 to 15 Cc.). It is also used as a gargle for throat affections and as a lotion for indolent ulcers and skin diseases, and applied on the surface of poultices to prevent putrescence and fetor.

AQUA FÆNICULI. U. S., Br. Fennel Water.

The U. S. formula is

Oil of Fennel,	2 Cc. or 30 minims
Purified Talc,	15 Gm. or ½ ounce av.
Distilled Water, q. s. to make	1000 Cc. or 32 fl.ounces

"Triturate the oil of fennel with the purified talc, add the distilled water gradually with continued trituration, filter and pass the filtrate through the filter repeatedly until the fennel water is perfectly clear." <U. S.

The Br. formula is

Fennel Fruit,	1 pound or 500 grammes
Water,	320 fl.ounces or 10 liters

Distil one-half. <Br.

AQUA HAMAMELIDIS. U. S. Hamamelis Water.

The U. S. P. directs

Hamamelis Bark,	10000 Gm. or 22 pounds
Water,	20000 Cc. or 5¼ gallons
Alcohol,	1500 Cc. or 50¾ fl.ounces
To make	10000 Cc. or 25⅘ gallons

"Macerate the hamamelis bark in water during twenty-four hours; then distil until 8500 Cc. (or 2¼ gallons) are obtained, add the alcohol and mix thoroughly." <U. S.

It is uncertain whether or not this preparation is designed to take the place of the Extractum Hamamelidis Destillatum prepared by manufacturers from the fresh twigs by steam distillation. (See this title).

AQUA HYDROGENII DIOXIDI. U. S., Br.

Liquor Hydrogenii Peroxidi. Solution of Hydrogen Dioxide.

"A slightly acid, aqueous solution of Hydrogen Dioxide, (H_2O_2 = 33.76), which should contain, when freshly prepared, about 3 per cent., by weight, of absolute hydrogen dioxide, corresponding to about 10 volumes of available oxygen." <U. S. Sp. gr. about 1.006 to 1.012 at N. T.

The Br. description of **Solution of Hydrogen Peroxide** which corresponds with this preparations is: "An aqueous solution of hydrogen peroxide, (H_2O_2), prepared by the interaction of water, barium peroxide, and a dilute mineral acid at a temperature below 50°F. (10°C.)." <Br. (See Liquor Hydrogenii Peroxidi).

This preparation was discovered in 1818 by Thénard, and has rapidly grown in public favor until in 1890 it was introduced into the U. S. P. and in 1898 in the Br. P.

Preparation. Barium dioxide 300 grammes, phosphoric acid, diluted sulphuric acid, distilled water, each, a sufficient quantity.

As the formula for this preparation requires greater care in manipulation than most formulas which druggists prepare, the directions for making are not repeated.

The manufactured preparations mostly contain from $\frac{1}{2}$ to $\frac{1}{8}$ grain of acetanilide in each fluid ounce. This preserves the preparation so that it does not deteriorate by keeping a reasonable length of time.

Some manufacturers furnish the drugs required for its preparation in a package together with directions more simple than those of the U. S. P.; but, as a rule, druggists buy this water already prepared, made by some reliable manufacturing chemist and sold by jobbers.

Medicinal Uses. Wonderful medicinal virtues have been accredited to hydrogen dioxide. It is known to be a powerful antiseptic and disinfectant and is much used in surgery to prevent putrefaction and destroy septic germs; also in dressing sores, ulcers and humors, and, diluted with water, to wash the hands and instruments. It has also been given internally in doses of $\frac{1}{2}$ to 1 fl.drachm (2 to 4 Cc.), diluted with water.

Average dose.—4 Cc. (1 fl.drachm).

The present U. S. P. omits the formula for this preparation. There is no change in the description following the title except in the chemical formula, which is now $H_2O_2=33.76$ (instead of $H_2O_2=33.92$); the difference being on account of the revised atomic weight of oxygen. It is also stated that this preparation should be kept in a cool place; and upon removing the stopper from the bottle, not more than a slight pressure should be observed. A considerable number of preparations which are essentially solutions of Hydrogen Dioxide are now on the market, put up as proprietary or semi-proprietary remedies, and introduced by advertising or other means of solicitation to physicians and dentists. There are also several proprietary preparations claiming to be solutions of Hydrogen Dioxide or Ozone, and largely advertised to the public, that are entirely different from the official solution.

Perhydrol. Manufacturers furnish a concentrated hydrogen peroxide of 30% strength—to 100 volumes, or about 10 times the amount of hydrogen peroxide contained in the official preparation. This must be handled with great caution and as it is quite expensive as compared with the official preparation it is not advisable to buy it, except for special uses.

AQUA LAUROCERASI. Br. Cherry Laurel Water.

The Br. P. formula is

"Fresh Cherry-Laurel leaves,	1 pound or 320 Gm.
Water,	50 fl.ounces or 1000 Cc.

Place the crushed cherry-laurel leaves with the water in a retort, distil one pint (or 400 Cc.) of liquid, shake the product, filter if neces-

sary; adjust the strength of the finished product either by adding hydrocyanic acid or by diluting the distillate with distilled water, so that, when tested as described under *Acidum Hydrocyanicum Dilutum*, it shall contain one-tenth percent. of hydrocyanic acid, HCN." <Br.

Dose, $\frac{1}{2}$ to 2 fl.drachms (2 to 8 Cc.).

In Br. pharmacy this water takes the place of bitter almond water.

Medicinal Uses. This is a pleasantly flavored water, valuable only for the hydrocyanic acid it contains. It is much used in Europe in cough preparations and in sedative mixtures. The dose is from $\frac{1}{2}$ to 1 fl.drachm (2 to 4 Cc.).

As fresh cherry-laurel leaves are not readily obtainable, and oil of cherry-laurel is to be had of drug jobbers, it is more convenient to prepare cherry-laurel water as follows:

Oil of Cherry-Laurel,	15 minims
Hydrocyanic Acid, diluted,	90 minims
Distilled Water,	32 fl.ounces

Shake them together frequently during 24 hours and filter.

This answers every purpose for which cherry-laurel water is required in this country and is much more easily prepared.

Quadruple Cherry Laurel Water. This water is imported in concentrated or saturated solution known as *Quadruple Cherry Laurel Water*. It may be diluted with 3 times its volume of distilled water for use.

AQUA MENTHÆ PIPERITÆ. U. S., Br. Peppermint Water.

This water or water made from some variety of *Mentha* is official in all pharmacopœias and is more frequently used than any other medicinal water.

The U. S. formula is

"Oil of Peppermint,	2 Cc. or 30 minims
Purified Talc,	15 Gm. or 250 grains
Distilled Water, a sufficient quantity	

To make 1000 Cc. or 32 fl.ounces

Triturate the oil of peppermint with the purified talc, add the distilled water gradually with continued trituration, filter and pass the filtrate through the filter repeatedly until the peppermint water is perfectly clear." <U. S.

Average dose.—16 Cc. (4 fl.ounces).

The Br. formula is

"Oil of Peppermint,	77 minims or 10 Cc.
Water,	240 fl.ounces or 15 liters

Distil two-thirds, (160 fl.ounces or 10 liters)." <Br.

The U. S. formula is the most readily made and answers every purpose of a distilled water. Magnesium carbonate may be used in-

stead of purified talc and produces a clearer preparation. If distilled from the oil as directed by the Br. formula it is of advantage to mix the oil with 4 ounces of sand before distilling.

Medicinal Uses. Peppermint water is one of the most used of the flavored waters. It is frequently prescribed as a vehicle for other medicines, especially in flatulence and other dyspeptic troubles. The dose is from 1 to 4 fl.drachms (4 to 15 Cc.).

AQUA MENTHÆ VIRIDIS. U. S., Br. Spearmint Water.

The U. S. formula is

"Oil of Spearmint,	2 Cc. or 30 minims
Purified Talc,	15 Gm. or 250 grains
Water, to make	1000 Cc. or 32 fl.ounces

Triturate the oil of spearmint with the purified talc, add the distilled water gradually with continued trituration, filter, and pass the filtrate repeatedly through the filter until the spearmint water is perfectly clear." <U. S.

Average dose.—16 Cc. (4 fl.drachms).

The Br. formula is

Oil of Spearmint,	77 minims or 10 Cc.
Water,	240 fl.ounces or 15 liters

Distil two-thirds, (160 fl.ounces or 10 liters). <Br.

Magnesium carbonate may be used with advantage instead of purified talc. If made by distillation it is advantageous to mix the oil with 4 ounces of sand before distilling.

Medicinal Uses. Spearmint water is used for the same purposes and in the same manner as peppermint water.

AQUA PIMENTÆ. Br. Pimento Water.

This is official only in the Br. P.

Pimento, bruised,	8 ounces av. or 250 grammes
Water,	320 fl.ounces or 10 liters

Distil one-half.

This is an agreeably flavored water, used in carminative mixtures and as a gastric stimulant.

AQUA ROSÆ. U. S., Br. Rose Water.

The U. S. P. directs

"Stronger Rose Water,
Distilled Water, each, one volume.

Mix them intimately before use." <U. S.

Average dose.—16 Cc. (4 fl.ounces).

The stronger rose water herein directed is what is known as triple or quadruple rose water, and is imported generally from the south of France.

“The rose water of commerce, prepared by distillation from the flowers of the *Rosa damascena*, diluted immediately before use, with twice its volume of distilled water.” <Br.

Ordinary rose water required in the drug business may be prepared extemporaneously by dissolving 5 minims of oil of roses in $\frac{1}{2}$ ounce of alcohol and adding to the solution $15\frac{1}{2}$ ounces of distilled water and filtering. It may also be made in the same manner from Rhodinol, but the flavor is not exactly the same.

The triple, or quadruple (as it is called by some manufacturers) rose water imported from France, when diluted with an equal volume of water, is better than any rose water that can be made in this country as our roses lack the fragrance of the European varieties.

Rose water is used in several official preparations and is much prescribed as a solvent for various substances, as in making eye waters, lotions etc. It is a favorite article for the toilet, either alone, or mixed in various preparations.

AQUA ROSÆ FORTIOR. U. S.

Stronger Rosewater. Triple or Quadruple Rosewater.

“Water saturated with the volatile oil of Rose petals, obtained by distillation.” <U. S.

This is the triple rose water of commerce, generally imported from France where it is obtained in the distillation of oil of rose. The rose petals are distilled with steam and after standing until cold, the undissolved oil of rose which rises to the surface is taken off, leaving a saturated rose water, which is the triple rose water of commerce. It is generally imported in copper cans of about three gallons capacity, or in glass carboys of $6\frac{2}{3}$ gallons.

This stronger or triple rose water is used as it is in making many toilet preparations and is diluted for making official rose water.

AQUA SAMBUCI. Br. Elder-Flower Water.

Fresh Elder Flowers, 10 pounds or 5000 grammes
or an equivalent quantity of flowers
preserved while fresh, with common salt.

Water, 5 gallons or 25 liters

Distil one-fifth.

Average dose.—8 Cc. (2 fl.ounces).

ARGENTUM—SILVER.

Symbol Ag. Atomic weight 107.66. Sp. gr. (fused) 10.4.

Silver is a well-known elementary metal extensively used in the arts and employed as the money currency of many countries. It is obtained mostly from its ores, from which it is separated by various

means, but is sometimes found in small quantities, as metallic silver. Its uses in the arts and commerce of the world are too well-known and general to require mention.

In pharmacy it is used in the metallic state only in the form of silver leaf (*Argentum Foliatum*) for coating pills, cachous etc., but its salts,—particularly silver nitrate—are much employed for making various preparations, and are considerably used in medicine. Recently a number of compounds of silver in colloid form, and united with organic substances as albumen, casein etc., have come into extensive use.

Solutions of its salts are precipitated by chlorine compounds forming a curdy white precipitate, insoluble in nitric acid but soluble in ammonia water. This forms a very delicate and characteristic test for silver.

The following are the U. S. and Br. official preparations of silver:

ARGENTUM PURIFICATUM. Refined Silver.

The Br. Ph., 1885, under this heading describes pure metallic silver. It may be made by dissolving coin silver in nitric acid and water, adding hydrochloric acid, which precipitates chloride of silver, leaving the copper alloy in solution; the liquid is poured off, the precipitate washed and melted with sodium carbonate, in a crucible. The melted metal is then poured off and consists of pure silver.

ARGENTI CYANIDUM. U. S. Silver Cyanide.

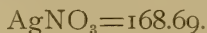
"It should contain not less than 99.9 percent. of pure silver cyanide, corresponding to 80.48 percent. of metallic silver." <U. S.

Preparation. This may be made by generating hydrocyanic gas in a retort by adding sulphuric acid to a solution of potassium ferrocyanide, distilling and conducting the vapor into a glass receiver containing a solution of silver nitrate. Silver cyanide is precipitated.

Uses. It is used in pharmacy for the extemporaneous preparation of hydrocyanic acid, which see.

ARGENTI NITRAS. U. S., Br. Silver Nitrate.

Syn. Lunar Caustic. Br.



"It should contain not less than 99.9 percent. of pure silver nitrate, and should be kept in dark amber-colored vials, protected from light." <U. S.

"A salt, AgNO_3 , prepared by the interaction of nitric acid and silver." <Br.

Silver nitrate is the working basis of most of the silver salts, and the most employed of any silver salt in pharmacy or medicine. It is also extensively used in photography.

A process for making it was formerly official, but has been omitted from the later pharmacopœias.

The Br. Ph., 1885, directs it to be made as follows:

Refined Silver,	3 ounces av.
Nitric Acid,	2½ fl.ounces
Distilled Water,	5 ounces av.

Add the nitric acid and the water to the silver in a flask and apply a gentle heat till the metal is dissolved. Decant the clear liquid from any black powder which may be present, into a porcelain dish, evaporate and set aside to crystallize. The crystals may be drained in a glass funnel.

Uses. Crystallized silver nitrate is used for making most of the other salts of silver, and is largely employed in photography, silver-plating, and the other arts and industries. In pharmacy it is used for making hair dye, indelible ink, test solutions etc., and in medicine it is used in solution to remove morbid growths, and as a caustic and escharotic, and internally in gastritis, diarrhœa and other derangements of the digestive tract, in doses of $\frac{1}{4}$ to $\frac{1}{2}$ grain, usually in the form of pills.

ARGENTI NITRAS FUSUS. U. S. Moulded Silver Nitrate.

Fused Silver Nitrate. Lunar Caustic. Lapis Infernalis.

"It should contain not less than 94.8 percent. of pure silver nitrate."

<U. S.

The U. S. P. directs

Silver Nitrate,	100 Gm. or 1 ounce av.
Hydrochloric Acid,	4 Gm. or 16 minims

"To the silver nitrate contained in a porcelain dish, add the hydrochloric acid, and melt the mixture at as low a temperature as possible. Stir well, and pour the melted mass into suitable molds." <U. S.

Uses. This is chiefly used as a caustic.

The Br. P. presents the following which is intended for similar purposes and has the advantage of being tougher, (less liable to breakage) than the U. S. preparation.

ARGENTI NITRAS INDURATUS. Br.

Toughened Caustic.

"Silver Nitrate,	475 grains or 95 grammes
Potassium Nitrate,	25 grains or 5 grammes

Fuse and mix thoroughly in a capsule of platinum or thin porcelain, and pour the melted mass into proper moulds." <Br.

ARGENTI NITRAS MITIGATUS. U. S., Br.

Mitigated Silver Nitrate. U. S. Mitigated Caustic. Br.

"It should contain not less than 33.3 percent. of pure silver nitrate."

<U. S.

The U. S. Pharmacopœia directs

Silver Nitrate,	30 Gm. or 30 grains
Potassium Nitrate,	60 Gm. or 60 grains

To be fused together in a porcelain capsule at as low a temperature as possible, thoroughly mixed and cast into suitable moulds.

The British and German pharmacopœias direct

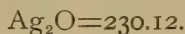
Silver Nitrate,	20 Gm. or 1 ounce
Potassium Nitrate,	40 Gm. or 2 ounces

To be fused together in the same manner. This is now called **Argenti Nitras Mitigatus** or Mitigated Silver Nitrate in the Br. P. and **Saltpeterhaltigessilberniträt** in the Ph. Ger. It is cast in the form of cylindrical sticks and also in the form of small cones.

Uses. This is now much used as a caustic and escharotic for external and internal application, as it is milder and just as efficient as the pure lunar caustic.

This is prepared in the form of sticks and cones or points which may be inserted in a caustic holder, making it convenient for application to the diseased part. Being milder this is now quite generally used as a caustic instead of fused or indurated silver nitrate.

ARGENTI OXIDUM. U. S., Br. Silver Oxide.



"It should contain 99.8 percent. of pure Silver Oxide, corresponding to not less than 92.9 percent. of pure metallic silver, and should be kept in dark amber-colored vials. Silver oxide should not be triturated with readily oxidizable or combustible substances, and should not be brought in contact with ammonia." <U. S.

"Silver oxide, Ag_2O , is prepared by mixing solutions of silver nitrate and calcium hydroxide." <Br.

Neither the U. S. nor the Br. P. give a formula for the preparation of this oxide.

The 1885 British Pharmacopœia directed as follows:

Silver Nitrate, in crystals,	$\frac{1}{2}$ ounce av.
Solution of Lime, (lime water),	67 fl.ounces
Distilled Water,	10 fl.ounces

Dissolve the silver nitrate in 4 ounces of the distilled water, and having poured the solution into a bottle containing the solution of lime, shake the mixture well, set it aside, and allow the deposit to settle. Draw off the liquid, collect the precipitate on a filter, wash with the remainder of the distilled water, and dry at a moderate temperature.

Uses. Silver oxide is somewhat used as a substitute for silver nitrate in medicinal preparations, being less caustic than silver nitrate. It is also employed as a basis of some of the silver salts. It may be made into pills or mixed with other powders and given in the form of capsules or wafers. Dose, $\frac{1}{2}$ to 2 grains.

The photographic art, indelible ink and hair dyes depend upon the conversion of silver nitrate into silver oxide, which is insoluble and turns to black upon exposure to sunlight.

The foregoing are the salts of silver now official in the U. S. and Br. pharmacopœias. There have recently come into medicinal use a number of preparations in which silver is combined with organic substances. They are as follows:

Argenol. Silver Albumin. A combination of silver with albumin, containing 10 percent. of silver; readily soluble in water and glycerin. It is an astringent bactericide, like silver nitrate but less irritant and more penetrating.

Protargol is a similar preparation containing 8 percent. of metallic silver.

Argonin. Silver-Casein. This is produced by the interaction of casein-sodium and silver nitrate. It is a whitish powder containing 4.2 percent. of silver, readily soluble in water. It is used chiefly in 2 to 5 percent. solution as an injection for gonorrhœa or an antiseptic wash.

Argentamine. This is one of the first organic compounds of silver put upon the market. It is a colorless alkaline liquid containing 10 percent. of silver nitrate in a 1 percent. solution of ethylenediamine. See also Part I., page 306.

Argentol. Silver quinaseptolate. A compound of silver with oxy-quinolinedisulphonic acid. A fine insoluble powder chiefly used in the form of ointment or dusting powder 1 to 2 percent. for ulcers, syphilitic sores etc., and in suspension 1:1000 to 1:2000 in thin mucilage for gonorrhœa.

Argentose. Silver-nucleo-proteid. **Nargol.** A combination of silver with yeast nuclein. A brownish powder, containing 10 percent. of silver, readily soluble in water. Used in $\frac{1}{2}$ to 20 percent. solutions in eye diseases, gonorrhœa etc.

Argyrol. Silver-Vitellin. This is an organic compound of silver containing 20 to 25 percent. of metallic silver and is known as the richest in silver of the organic compounds. It is in glistening scales of a blackish-brown color, soluble in its weight of water and glycerin, but insoluble in alcohol. It is used in gonorrhœa and infectious diseases in the form of solution.

Collargol. Collodial Silver. *Argentum Credé.* This is an allotropic form of metallic silver introduced by Dr. Credé and said to contain 85.87 percent. of silver, with a small percentage of albumen and products of its oxidation. It is in small, hard, brittle scale-like pieces, of a bluish-black color. It is soluble in about 20 parts of distilled water, and the solution will keep unchanged under ordinary conditions for several months. In solution it is used by intravenous injection in the treatment of septicemia and pyemia; in the form of ointment, 15 percent. (*Unguentum Credé*) it is used by inunction and as an application against infection. It is also given internally in tablets $\frac{1}{2}$ to 2 grains, and is used in the form of injection and enema in solution.

ARISTOL. Annidalin. Dithymoldiiodide.

A brownish-red, odorless, amorphous powder, insoluble in water and glycerin, slightly soluble in alcohol, readily soluble in ether and colodion, also in fatty oils and petrolatum. This compound is made by the decomposition of a solution of iodine and potassium iodide in water, by an alcoholic solution of thymol. The method of preparing it requires much care and is therefore inexpedient for the use of druggists. It is probably a combination of two molecules of thymol with two atoms of iodine. It is decomposed by light and heat. Aristol was produced as a substitute for iodoform, having similar local action and being non-irritant and non-poisonous. It is given internally in doses of 3 grains three times a day in pulmonary complaints, chronic dysentery etc.

It is also a hemostatic, which property is perhaps due to its forming a thick tenacious paste with the blood. This is taken advantage of in dental surgery to prevent the flow of blood or check hemorrhage, and it may be applied to any hemorrhage for the same purpose.

ARISTOTOCHIN. Aristoquin.

This is, chemically, diquinine carbonic ester. It is a white, tasteless powder containing 96 percent. of the quinine alkaloid, soluble in chloroform, alcohol or acids and yielding a tasteless powder which does not irritate the stomach nor produce the usual quinine bad effects. It is employed considerably in whooping cough and other diseases of children. Its dosage is the same as most of the quinine salts, according to the age of the patient.

ARSENICUM. ARSENIC.

Symbol As; Atomic weight (O=16) 75; Sp. gr. 5.73 to 5.88.

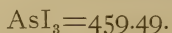
Arsenicum, more commonly called Arsenic, is a brittle, gray-colored metallic element, very much resembling antimony in its general appearance and characteristics. The metal itself is seldom used in medicine but its compounds are considerably used in the arts and are the basis of many medicinal preparations.

Arsenic and its compounds are more fully described in the Chemical Section of this work, Part I.

The following are official in the U. S. P.

ARSENI IODIDUM. U. S. ARSENI IODIDUM. Br.

Arsenic Iodide. U. S. Arsenious Iodide. Br.



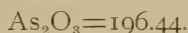
"Arsenious Iodide may be obtained by the direct combination of iodine and arsenium." < Br.

This compound is made by directly combining 1 part of metallic arsenic in fine powder with 5 parts of iodine, then warming the mix-

ture in a flask until liquified, and pouring upon a marble slab to cool.

Uses. Iodide of arsenic is chiefly used in pharmacy for preparing Donovan's solution; in medicine it is given as an alterative in doses of one-sixteenth grain, and sometimes used in ointments, and in solutions as a caustic for warts and morbid growths.

ARSENI TRIOXIDUM. U. S. Arsenic Trioxide.



[Acidum Arsenosum, Pharm. 1890].

"It should contain not less than 99.8 percent. of pure Arsenic Trioxide." <U. S.

This is the common arsenic of commerce. It is prepared by roasting arsenical ores in suitable furnaces, collecting the vapor and re-subliming. As will be noticed by its formula it is not a true acid, but an anhydride or oxide.

"Arsenious anhydride, or arsenious oxide, As_2O_3 , is obtained by roasting certain arsenical ores." <Br.

Uses. In pharmacy arsenic is extensively put up and sold as a rat poison, and its solution with alkalies is used to saturate paper sold as fly-paper; it is also used for making most of the medicinal preparations of arsenic. In medicine it is employed as an alterative in doses of one-thirty-second to one-twentieth grain, and used with other substances as a caustic application to cancers and fungus growths.

Antidote. The most effectual antidote for arsenical poisoning is freshly prepared ferric hydrate, with which it forms insoluble ferrous arsenate. See Ferri Oxidum Hydratum.

Besides the regular official combinations of arsenic many others have been introduced, under proprietary or trade names, and have been recognized by the profession as meritorious; the more important are as follows:

Arsenauro. A solution of gold and arsenic bromides in which each 10 minims contains $\frac{1}{32}$ grain each of arsenic and gold bromides. It is used as an alterative, nerve tonic and antidiabetic. Dose 3 to 10 minims.

Arsen-Ferratin. A combination of iron and arsenious acid in the form of a red powder of peculiar odor. It contains 0.06 percent. of arsenous acid and is used as a tonic and alterative in doses of 5 to 10 grains.

Arsylin. Arsen-protylin. A compound of arsenic, phosphorus and albumin, containing 0.1 percent. of arsenic acid, 2.6 percent. of phosphorus, combined with albumin. It is a yellowish-white powder, which by its combination is not absorbed until it reaches the intestines. It is prescribed as an alterative nerve tonic. Dose 5 to 10 grains.

Atoxyl. The brand name of sodium arsanilate, containing about 26 percent. of arsenic. It is a white, tasteless, crystalline powder,

readily soluble in water and is claimed to be less toxic than other forms of arsenic. It is generally administered subcutaneously in solution, the dose being from 1 to 3 grains per day in divided portions.

This is used in combination with iron, mercury or quinine in cases where arsenic with these drugs is indicated.

Salvarsan. "6c6." This is the new specific introduced by Dr. Ehrlich, for spiral germ diseases. It is, chemically, oxydiaminoarsenobenzol. It will be further noticed under the above title in alphabetical order.

For other salts of arsenic see Chemical Section, Part I.

ASPIRIN.

This is the trade name for acetyl-salicylic acid or salicylic acid acetic ester. In white needles readily soluble in alcohol and ether but only slightly soluble in water. In solution it is decomposed, and should, therefore only be given in powdered form. It is employed chiefly as a substitute for sodium salicylate, in rheumatism etc., and is given in the same manner and doses as this salt.

ATROPINA. U. S., Br. Atropine. (Atropia).



"An alkaloid obtained from *Atropa Belladonna*, Linné (Fam. Solanaceæ), and from other plants of the same family. As it occurs in commerce it is usually accompanied by a small amount of hyoscyamine from which it cannot readily be separated. It should be kept in amber-colored, well-stoppered vials." < U. S.

"An alkaloid, $\text{C}_{17}\text{H}_{23}\text{NO}_3$, obtained from *Belladonna* leaves or root." < Br.

This is the principal alkaloid of belladonna, official in the U. S., Br. and nearly all pharmacopœias. It may be prepared by the following process, which is in part adopted from the 1885 Br. P.

Belladonna Root, in coarse powder,	2 pounds
Alcohol, sufficient.	
Slaked Lime,	1 ounce
Diluted Sulphuric Acid, sufficient.	
Potassium Carbonate, sufficient.	
Chloroform,	3 fl.ounces
Purified Animal Charcoal, sufficient.	
Distilled Water,	10 fl.ounces

Moisten the powder with a pint of alcohol, pack firmly in the water-bath percolator, and pour alcohol upon it until the drug is covered; set in a warm place to macerate two days, then heat very moderately and after one hour, begin to percolate, adding alcohol, and continuing the heat and percolation until the drug is exhausted; add the lime to the tincture thus obtained and agitate thoroughly; then filter; add

sufficient dilute sulphuric acid to the filtrate to acidulate it slightly, filter again, distil off most of the alcohol, add the distilled water and evaporate until no odor of the alcohol remains; then cool and carefully add potassium carbonate dissolved in water to nearly neutralize the acid, taking care not to add an excess, and set aside for several hours; then filter, and add an excess of potassium carbonate, then the chloroform, and agitate thoroughly for some time, allow to separate, pour off the upper liquid, distil the chloroform from the remainder, dissolve the residue in a little warm alcohol, digest the solution with a little animal charcoal, filter, evaporate and cool, until colorless crystals of atropine are obtained.

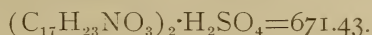
It is soluble in 450 parts of water, 1.46 parts of alcohol, 16.6 parts of ether, and 1.56 parts of chloroform at 25°C. (77°F.).

Uses. On account of its insolubility atropine is but little used except in oleates and ointments. It has the same properties as belladonna. Dose, $\frac{1}{120}$ to $\frac{1}{60}$ grain in trituration.

Average dose.—0.0004 Gm.=0.4 milligramme ($\frac{1}{160}$ grain). U. S.

ATROPINÆ SULPHAS. U. S., Br.

Atropine Sulphate. (Sulphate of Atropia).



"The sulphate $[SO_2(OH)_2 \cdot (C_{17}H_{23}NO_3)_2]$, of an alkaloid obtained from *Atropa Belladonna*, Linné (Fam. Solanaceæ), and from other plants of the same family. As it occurs in commerce it usually contains a small amount of hyoscyamine sulphate, from which it cannot be readily separated." <U. S.

"Atropine sulphate, $(C_{17}H_{23}NO_3)_2 H_2SO_4$, may be obtained by neutralizing atropine with diluted sulphuric acid." <Br.

Atropine,	120 grains
Distilled Water,	4 fl.drachms
Diluted Sulphuric Acid, sufficient.	

Rub the atropine first to a fine powder and then to a smooth mixture with the water, and add diluted sulphuric acid, drop by drop, until the alkaloid is dissolved and the solution is neutral. Evaporate the solution to dryness at a temperature not exceeding 37.70°C. (100°F.).

Uses. This salt is quite soluble in water, and its solution (1 to 100) is employed as a mydriatic (to dilate the pupil of the eye) and for other purposes in which the action of belladonna is desired. The adult dose, internally, is $\frac{1}{120}$ to $\frac{1}{60}$ of a grain, or less, in trituration.

Average dose.—0.0004 Gm.=0.4 milligramme ($\frac{1}{160}$ grain). U. S.

Atropine Methylbromide. $C_{18}H_{26}NO_3Br$. This salt of atropine was introduced by Dr. L. Vaupel as a mydriatic etc., similar to atropine but more speedy and less persistent in its action than it. It is used in 1 percent. solution for application to the eye.

AURUM — GOLD.

Symbol Au; Atomic weight 195.7; Sp. gr., average, 19.3.

Gold is one of the most valuable of the metallic elements. It is used as the standard money basis of all countries, and, on account of its value, malleability, ductility, and permanence of color, is extensively used for ornamentation and for making useful and valuable articles. It is obtained mainly as a free metal or alloyed with other metals. It is one of the "Noble Metals."

Metallic gold is used in pharmacy only in the form of gold leaf, for coating pills, cachous etc. The only salt of gold which is much used in pharmacy or medicine is the chloride of gold and sodium, which is official in the U. S. and Ger. pharmacopœias.

AURI ET SODII CHLORIDUM. U. S.**Gold and Sodium Chloride.**

"A mixture of equal parts, by weight, of anhydrous Gold Chloride [$\text{AuCl}_3=301.24$], and anhydrous sodium chloride (NaCl), representing not less than 30 percent. of metallic gold. It should be kept in well-stoppered, amber-colored vials." <U. S.

Preparation. The German pharmacopœia directs 0.05 parts of pure gold to be dissolved by gentle heat in a mixture of 65 parts of nitric acid and 240 parts of hydrochloric acid; the solution is then to be diluted with 200 parts of water and 100 parts of pure dry sodium chloride dissolved in the mixture, which is then to be evaporated to dryness by means of a water-bath, with constant stirring.

Uses. This salt is considerably used in photography for "toning" prints, and for electroplating. In medicine it is given as an alternative in doses of $\frac{1}{12}$ to $\frac{1}{4}$ grain.

Gold Cures. For the so-called "Gold Cures" see Proprietary Medicines.

AZOTUM. Azote. Nitrogen.

This name was given to nitrogen by Lavoisier, and is used in France in place of nitrogen; as *Acide Azotique*, nitric acid; *azotic acid*.

Azotates are nitrates, as *Azotate de Potasse*, potassium nitrate etc.

Azotites are nitrites; as *Azotite d'Amyle*, amyl nitrite etc.

BARIUM.

Symbol Ba; Atomic weight ($\text{O}=16$), 137.37; Sp. gr. 3.75.

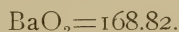
Barium is a metallic element closely related to calcium and magnesium. It is not found uncombined in nature but may be obtained from its oxide *baryta* by heating it in an iron tube through which the vapor of potassium is conveyed. The reduced barium is then extracted from the mixed residuum in the tube by treating with mercury and the mercury is afterwards driven off by distillation in a vapor of mineral naphtha.

The metal was first isolated by Sir H. Davy in 1808. It has a greenish-silver-white luster, is malleable, decomposes water and is gradually oxidized in the air, forming baryta or barytes, BaO.

Barium and its compounds are more fully described in the Chemical Section, Part I.

BARII DIOXIDUM. Barium Dioxide.

[Barium Peroxide].



This was official in the U. S. P. 7th revision, but was dismissed in the 8th.

It was described as "Commercial, anhydrous barium dioxide." This was used chiefly in the production of hydrogen peroxide. It is almost insoluble in cold water but dissolves readily in hydrochloric, phosphoric and other acids (except sulphuric), forming salts of barium corresponding to the acid employed.

Other barium salts are described under the heading Barium, in the Chemical Section, Part I.

BEBERINUM. Beberine.



An alkaloid obtained from bebeeru or nectandra bark in which it occurs combined with Nectandrine, $\text{C}_{40}\text{H}_{46}\text{N}_2\text{O}_8$, and other alkaloids. It is identical with buxine, from box, and pelosine or cissampeline from pariera. The alkaloid beberine is but little used in medicine but is the basis of salts that are considerably employed.

From the similarity of the name to berberine, obtained from barberry, care must be used in dispensing this alkaloid and its salts.

Beberine Sulphate. This was official in the Br. P. 1885, but was dismissed in the 1898 revision.

Preparation. It may be prepared in the same manner as other sulphates of alkaloids, either by adding sufficient diluted sulphuric acid to beberine to dissolve it, evaporating and crystallizing, or by percolating coarsely powdered bebeeru bark with water acidulated with $\frac{1}{2}$ ounce sulphuric acid for each pound of bark taken, until exhausted, then evaporate the percolate to 20 fl.ounces for each pound of drug used, and variously treating to separate and purify the sulphate salt.

Uses. This is somewhat used as a substitute for quinine and has similar action but is not considered its equal. The dose is from 1 to 10 grains.

BELLADONNA FOLIA. U. S., Br. Belladonna Leaves.

"The dried leaves of *Atropa Belladonna*, Linné (Fam. Solanaceæ), yielding, when assayed by the process given, not less than 0.35 per cent. of mydriatic alkaloids." <U. S.

The assay process for this drug is fully described in the U. S. P., 8th revision.

"The fresh leaves and branches of *Atropa Belladonna*, Linn., collected when the plant is in flower." <Br.

Notice that the U. S. P. requires the dried leaves corresponding to an assay and that the Br. P. directs the fresh leaves and branches of the plant.

In the U. S. P. *Extractum Belladonnæ Foliorum* and *Tinctura Belladonnæ Foliorum* are made from the dried leaves. In the Br. P. *Extractum Belladonnæ Viride* is made from the fresh leaves and young branches.

Average dose of belladonna leaves, 0.065 Gm.=65 milligrammes (1 grain). <U. S.

This is further described in Part I. under the title *Belladonna*.

BELLADONNÆ RADIX. U. S., Br. Belladonna Root.

"The dried root of *Atropa Belladonna*, Linné (Fam. Solanaceæ), yielding, when assayed as directed, not less than 0.5 percent. of mydriatic alkaloids." <U. S.

The assay process is the same as for belladonna leaves and is fully described in the U. S. P., 8th revision.

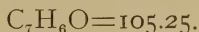
"The root of *Atropa Belladonna*, Linn., collected in the autumn and dried." <Br.

In the U. S. P. *Fluidextractum Belladonnæ Radicis* is prepared from the root. In the Br. P. *Extractum Belladonnæ Alcoholicum*, and *Extractum Belladonnæ Liquidum* are prepared from the root.

Average dose of belladonna root, 0.045 Gm.=45 milligrammes ($\frac{3}{4}$ grain). <U. S.

This is further described in Part I. under the title *Belladonna*.

BENZALDEHYDUM. U. S. Benzaldehyde.



"An aldehyde produced artificially, or obtained from natural oil of bitter almond or other oils, and containing not less than 85 percent. of pure Benzaldehyde [$\text{C}_6\text{H}_5\cdot\text{COH}$]. It should be kept in small amber-colored, well-stoppered bottles." <U. S. Sp. gr. about 1.045 at 25°C. (77°F.). Soluble in water 1 part in 300; in alcohol all proportions.

Preparation. This is artificial oil of bitter almond, produced by the action of chlorine upon hot toluene. Benzyl chloride first results and when this is distilled with a solution of lead nitrate in an atmosphere of carbon dioxide gas, benzoic aldehyde is produced. Other methods of making this are also used.

Benzaldehyde is identical with oil of bitter almonds and only

differs from it in not containing hydrocyanic acid which is considered an advantage. It is chiefly used for flavoring.

Average dose.—0.03 Cc. ($\frac{1}{2}$ minim).

BENZINUM. U. S. Petroleum Benzin.

Benzin. Benzine. Petroleum Ether.

"A distillate from American petroleum, consisting of hydrocarbons, chiefly of the marsh-gas series, (C_3H_{12} , C_6H_{14}), and homologous compounds." < U. S. Sp. gr. from 0.638 to 0.660, and boiling at $45^{\circ}C.$ ($113^{\circ}F.$). It is soluble in 6 parts of alcohol, in ether, chloroform, volatile oils and fixed oils except castor oil.

The preparation thus described in the U. S. P. is obtained by fractional distillation from petroleum, and is known in the market as **Benzine** or **Naphtha**. On the Pacific coast it is called **Distillate**. It consists mainly of the hydrocarbons **pentane** and **hexane**. Gasoline, which is of less specific gravity, is frequently used in place of it for pharmaceutical purposes. It is quite different from the **benzene** obtained from coal-tar, which constitutes the greater portion of what is commonly known as **benzol**.

It is a powerful solvent for fixed oils, resins, caoutchouc, paraffin etc., and is used in pharmacy for extracting oleo-resins, for purifying some solutions and for other purposes. It is extensively used in some patented processes for obtaining the oil from linseed and other oil seeds, being subsequently separated by distillation.

It is considerably used either alone or combined, for removing grease spots from clothing.

Benzine used by painters is usually a heavier liquid, sp. gr. from 0.725 to 0.737. It is the last of the run which distils before illuminating oil is taken off. It has a stronger odor than the lighter distillate as above described.

BENZOL. Br. Benzol.

"A mixture of homologous hydrocarbons obtained from light coal-tar oil. It contains about 70 percent. of benzene, C_6H_6 , and about 20 to 30 percent. of toluene, C_5H_5, CH_3 ." < Br.

The introduction of benzol into the Br. P. makes a clearer distinction than heretofore between **benzol** and **benzene**, what is now distinguished as benzol having quite generally been called benzene, which is only one of the constituents of benzol.

Benzol was first obtained by Faraday in 1825, in the products of destructive distillation of whale oil; and soon afterward, by Mitscherlich, who obtained it from benzoic acid, from which it derives its name. In 1849, Mr. C. B. Mansfield discovered its presence in coal-tar naphtha, from which commercial benzol is now chiefly obtained.

In the arts the importance of benzol cannot be overestimated. It

is the commercial basis of aniline, of nitrobenzol, and a great number of products of chemistry and pharmacy, which at the present time are attracting much attention.

Benzene or Phenyl Hydride, C_6H_6 , which constitutes the major part of benzol, is the first member or basis of the important homologous series of hydrocarbons obtained from coal-tar, known as the **Aromatic or Benzene Series**. C_nH_{2n-6} .

With other hydrocarbon bases benzene forms a series of compounds classed with the Aromatic or Benzene Series, the most important of which are:

C_6H_6 Benzene,	C_6H_6 .
C_7H_8 Toluene or Methylbenzene,	$C_6H_5(CH_3)$.
C_8H_{10} Xylene or Ethylbenzene (and other isomers),	$C_6H_5(C_2H_5)$.
C_9H_{12} Propylbenzene (and other isomers),	$C_6H_5(C_3H_7)$.
$C_{10}H_{14}$ Isobutylbenzene (and other isomers),	$C_6H_5.C_3H_7(CH_3)_2$.
$C_{11}H_{16}$ Isoamylbenzene (and other isomers),	$C_6H_5.C_3H_7(CH_3)_2$.
$C_{11}H_{18}$ Methyl-isoamylbenzene,	$C_6H_4(CH_3).C_3H_7(CH_3)_2$.
$C_{12}H_{20}$ Dimethyl-isoamylbenzene;	$C_6H_3(CH)_2.C_3H_7(CH_3)_2$.

Benzene should not be mistaken for benzine or benzin which is obtained from petroleum, as they differ materially in composition and characteristics. Some of the differences are here noted. Benzol can be frozen, benzine has never been congealed. Benzol can be converted into nitrobenzol, aniline and many other chemical compounds, while benzine cannot.

Nitrobenzol. $C_6H_5NO_2$. Artificial oil of bitter almond, oil of mirbane, is made by adding benzol in small portions to fuming nitric acid. A violent reaction occurs, and a dark-red liquid results. Water is added and an oily liquid precipitates; the water is poured off and the oily precipitate repeatedly washed with fresh water. It is chiefly used for scenting soaps and for the manufacture of aniline. It should never be used for flavoring medicinal preparations.

BENZOYL.



The compound organic radical of an extensive series of aromatic compounds derived directly or indirectly from benzoïn.

Benzoyl Anilid. Benzanilid. $C_6H_5NHCOC_6H_5$. This is prepared by the action of benzoyl chloride or benzoic aldehyde on anilin. It is colorless, and in micaceous, lustrous, scaly crystals, insoluble in water but soluble in alcohol; melting point $163^\circ C$., distilling, unchanged at a higher temperature. It is used as an antiseptic, and antifebrile, the dose being 3 to 8 grains.

Benzoyl Ecgonine. This may be prepared by adding a hot concentrated solution of cocaine to a hot solution of benzoic acid until the acid is neutralized, then concentrating and crystallizing. Its properties are similar to those of cocaine, but it does not, like that, cause paralysis of the sensory nerves.

Benzoyl Eugenol. $C_6H_5C_3H_5(OCH_3)CO_2C_6H_5$. This compound may be produced by the interaction of Eugenol Acetamide with benzoic acid. It is produced in neutral acicular crystals which melt at $70.5^\circ C$., are free from color and odor and have a slight bitter taste. It is nearly insoluble in water, slightly soluble in cold alcohol, freely soluble in hot alcohol, ether and chloroform. It is a powerful antiseptic, recommended for phthisis and septic diseases.

Benzoyl Guaiacol. Benzosol. $C_6H_4OCH_3OCOC_6H_5$. This may be produced by heating together guaiacol and benzoic acid or benzoyl chloride in equivalent quantities in the same manner as is directed for making benzoyl naphthol, (which see).

It is a colorless, crystalline, nearly odorless powder, melting at $50^\circ C$. It is employed as a substitute for creosote in the treatment of phthisis and other septic diseases. The dose is 4 grains, gradually increased to 12 grains, 4 times a day.

Benzoyl Naphthol. Benzo-Naphthol. Beta-Naphthol Benzoate. $C_{10}H_7O(C_7H_5O)$. This forms in a white crystalline powder or long needles. It is free from taste and odor and insoluble in cold water, sparingly soluble in alcohol, but quite soluble in chloroform. It is prepared by heating together beta-naphthol and benzoyl chloride in about equal quantities, on a sand-bath. The reaction begins at $125^\circ C$. and at $170^\circ C$. is concluded in half-an-hour; on cooling the mass crystallizes in a cake which is then treated with successive portions of boiling alcohol to extract the benzo-naphthol from the solution of which it crystallizes when cold. It is given as an antiseptic for intestinal fermentation etc., in doses of 4 to 8 grains every two or three hours.

Benzoyl Peroxide. $C_6H_5:CO \cdot O \cdot O \cdot CO:C_6H_5$. This may be prepared by acting upon sodium peroxide 5 parts by benzoyl chloride 9 parts, at $4^\circ C$. ($39^\circ F$.). The precipitate formed is separated, dissolved in hot alcohol from which it is crystallized. It is slightly soluble in water, more soluble in alcohol, and soluble in from 35 to 50 parts of olive oil. It is a powerful disinfectant when applied to ulcers or gangrenous wounds either as a dusting 1 part with 10 parts of powdered talc, or in solution in oil or in the form of ointment 1:10.

Benzoyl Phenetidine. A compound of the benzoyl radical with phenetidine, also known as "benzo-phenoneid." It is prepared by the decomposition of an aniline compound, and is claimed to be a very efficient non-irritating germicide for local use and application to wounds, ulcers and diseased mucous membranes. It is soluble in 100 parts of cold water.

Benzoyl Sulphonic-imide. The same as saccharine or gluside, (which see). It is official in the U. S. P. under the title **Benzosulphinidum**, see below.

Benzoyl Tropine. This is formed by heating tropine with benzoic acid and diluted hydrochloric acid to 100°C. It occurs in silky needles, and is a powerful local anæsthetic.

Other benzoyl compounds may be formed with other acids and alkaloids.

BENZINUM PURIFICATUM. U. S.

Purified Petroleum Benzin.

This is official only in the U. S. P., the formula is:

Potassium Permanganate,	10 Gm. or 154 grains
Sodium Hydroxide,	2 Gm. or 32 grains
Sulphuric Acid,	60 Cc. or 2 fl.ounces
Petroleum Benzin,	1000 Cc. or 35 fl.ounces

Water, a sufficient quantity.

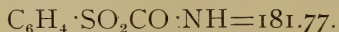
"Add the acid to 550 Cc. (or 19 fl.ounces) of water and when the mixture has become cold, pour it into a bottle having the capacity of two liters (70 fl.ounces). Add 8 Gm. (or 124 grains) of potassium permanganate and agitate until it is dissolved, then add the petroleum benzin, in four portions, shaking the liquid after each addition. Allow the liquid to remain in contact for twenty-four hours, shaking the bottle at frequent intervals; then decant the petroleum benzin into another bottle of the same capacity, and having dissolved 2 Gm. (or 30 grains) of potassium permanganate in 240 Cc. (or 8½ fl.ounces) of water in which the sodium hydroxide has previously been dissolved, mix the liquids and agitate the mixture frequently during several hours, then decant, repeat the washing with water and again decant the Purified Petroleum Benzin." <U. S.

The object of this treatment is to purify the benzin from all grease, pyrogenous products and sulphur compounds. When thus treated it is practically deodorized, having only a faint ethereal petroleum odor.

Gasoline is a lighter product than Benzin, its sp. gr. being from 0.629 to 0.667. (95° to 80°, B.).

This is very extensively used as fuel for domestic use, and for producing power in internal combustion engines. In Europe it is called **Petrol**.

BENZOSULPHINIDUM. U. S. Benzosulphinide. Saccharin.



"The anhydride of ortho-sulphonic-amide-benzoic acid (benzoyl-sulphonic-amide)." <U. S.

This compound, which is more commonly known as Saccharin or by some other trade title, is a white, crystalline powder having an intensely sweet taste even in diluted solutions. It is soluble in 250 parts of water and in 25 parts of alcohol at 25°C. (77°F.), and is very readily soluble in any alkaline or alkali carbonate solutions.

The manner of preparing this compound, and other facts concerning it are more fully described under its Br. title "Glusidum," which see.

Average dose.—0.200 Gm.=20 milligrammes (3 grains).

BERBERINA. Berberine.



The alkaloid Berberine is found in a large number of plants, but is most abundant in hydrastis, columbo, gold-thread and several species of barberry.

Preparation. It may be obtained by several methods; but perhaps the simplest and best is by boiling the coarsely-powdered barks or roots, or, preferably, percolating them in the water-bath percolator with boiling water until they are exhausted. The decoction is then to be evaporated to a soft extract and washed with successive portions of alcohol to dissolve out the berberine; to the alcoholic washings, mixed and filtered, a little water is then to be added, and the alcohol distilled off by means of a water-bath; the remaining liquid is then condensed, allowed to cool, and crystals of berberine will form; these may be purified by dissolving in hot water and recrystallizing.

Uses. The alkaloid is but little used, but its salts are extensively employed in medicine. It is a tonic to the mucous membrane, a bitter stomachic and general alterative, and has properties similar to quinine. The dose is from 1 to 8 grains.

BERBERINÆ HYDROCHLORAS.

Berberine Hydrochloride.

Preparation. This salt, which was formerly known as **hydrastin**, is generally prepared from golden seal. A decoction may be made, evaporated and treated with alcohol in the same manner as is directed for making berberine. A little water, acidulated with hydrochloric acid, is then to be added to the alcoholic solution, the alcohol distilled, and the remaining liquid set aside, in which the crystals of berberine hydrochloride will form; these are to be drained from the mother liquor, dissolved in hot water and purified by recrystallization.

It has gained considerable notoriety as an Eclectic remedy under the name of hydrastin, and was afterwards known as muriate of hydrastin; but it is of a bright-yellow color, and has been proven to be the berberine hydrochloride, the salts of hydrastine being white.

Uses. Its uses are similar to the alkaloid—a tonic to the mucous surfaces etc. It is much used in atonic dyspepsia and weakness of the digestive tract. Dose, 1 to 4 grains.

BERBERINÆ SULPHAS. Berberine Sulphate.

This is prepared by dissolving berberine in hot water acidulated with sulphuric acid, crystallizing, redissolving the crystals in hot water and recrystallizing; or it may be made directly from the barks

or roots containing berberine, except that water acidulated with sulphuric acid, instead of water, must be added to the alcoholic solution before distillation.

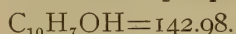
Uses. The uses of this salt are similar to the alkaloid. It is also used in making elixirs etc. The dose is from 1 to 4 grains.

Berberine Carbonate. This salt may be prepared by passing a current of carbon dioxide through a solution of the alkaloid berberine.

Berberine Phosphate. This may be prepared in a similar manner as the sulphate by using phosphoric acid instead of sulphuric. The hypophosphite has also been prepared.

The uses of these salts are the same as the sulphate.

BETANAPHTHOL. U. S. [Naphthol, Pharm. 1890].



"A monatomic phenol occurring in coal-tar, but usually prepared from Naphthalene." < U. S.

Preparation. This may be prepared by digesting naphthalene with three parts of sulphuric acid. Heat the mixture to 80°C., when α - and β -naphthalin-sulphonic acids are formed, and may be separated from the acid by means of lead or barium salts. When heated with sulphuric acid, the α -acid passes into the β -variety, therefore the latter acid is always produced at a higher temperature (up to 160°C.). Both of the naphthalin-sulphonic acids may be fused with sodium or potassium hydroxide, and yield the corresponding naphthols, which are known as α - and β -naphthols, the latter being the official betanaphthol as above.

Properties. It is in colorless or amber-colored, shining crystalline laminae, or in powder having a faint, phenol-like odor and a sharp and pungent, but not persistent taste. It is soluble in about 950 parts of water and in 0.61 part of alcohol at 25°C., also very soluble in ether, chloroform or solutions of the caustic alkalies. It readily sublimates when heated; it melts at 122°C. (251.6°F.), and boils at 286°C. (546.8°F.). This is used for similar purposes as naphthalene in the form of ointments, solutions etc. It has also been given internally in doses of 5 to 8 grains, in typhus fever and obstinate diarrhoea.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

Naphthol Alpha. White or reddish crystals, soluble in alcohol, and very slightly soluble in cold water. An antiseptic seldom employed in medicine, but useful in the arts.

Naphthol Aristol. This is recommended as an antiseptic. A combination of naphthol with aristol.

Betanaphthol Salicylate. Betol. Naphthalol. Naphto-Salol. Salinaphthol. The salicylate of Betanaphthol is known by the foregoing trade names, but is most generally called for as Betol.

It is a colorless, tasteless, odorless, crystalline compound, insoluble in hot or cold water and but slightly soluble in cold alcohol, but dissolves readily in 3 parts of hot alcohol, and in ether and chloroform. It does not dissolve in the stomach but rapidly passes into solution when acted upon by the pancreatic and intestinal juices. It is employed particularly as an intestinal antiseptic and antiferment and in catarrhal condition of the bladder. Bougies containing 10 to 25 percent. of the salt, with cacao butter, are used for gonorrhœa and a 10 percent. ointment is useful for eczema.

Dose, internally, 5 to 10 grains, 3 or 4 times a day.

Betanaphthol Benzoate is described under Benzoyl Naphthol.

Betanaphthol Bismuth is known as "Orphol."

Betanaphthol Salicylate is known as "Betol."

BETOL. Naphthalol. Naphtho-Salol. Beta-Naphthol Salicylate.

A colorless, tasteless, odorless, crystalline compound, insoluble in hot or cold water, and only slightly soluble in cold alcohol, but readily soluble in 3 parts of hot alcohol and in ether. It is prepared by heating together beta-naphthol, sodium, sodium salicylate and phosphoric chloride. It has been proposed as a substitute for salol, but is not considered so valuable as it is less soluble. It is an antiseptic and antiferment, and may be employed in the local treatment of gonorrhœa, made up in the form of bougies with some inert substance, as butter of cacao, which will dissolve one-fourth of its weight of crystals. A 10% ointment is also an excellent application for eczema. The dose of this salt internally is 5 to 10 grains, 3 or 4 times a day.

BISMUTHUM. Bismuth.

Symbol Bi; Atomic weight ($O=16$) 208.0; Sp. gr. 9.82.

The foreign names for Bismuth and its salts are very similar, except the German, in which it is Wismuth.

Bismuth is a metallic element, classed, on account of its analogies, with arsenic and antimony. It is found in nature in a metallic state and combined with other metals and ores. In appearance it closely resembles antimony. It is crystalline, brittle, pulverizable, and has a reddish silver color. It melts at 264°C . (507°F .), and is readily obtained from its ores by fusion. Upon solidifying after fusion it expands one-thirty-second of its volume.

Bismuth is used in the arts chiefly as an alloy with other metals. In pharmacy it is used in the preparation of many of its salts, which are employed in medicine, and also as an ingredient in toilet powders and liquid cosmetics. The metal bismuth is not used in medicine, but some of its salts are highly esteemed and much used. This metal and its alloys and salts are fully described in the Chemical Section, Part I. The following are the salts of bismuth official in the U. S. and Br. Ph.:

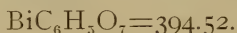
BISMUTHI CARBONAS. Br. Bismuth Oxycarbonate.

"Bismuth Oxycarbonate, $(\text{Bi}_2\text{O}_2\text{CO}_3)_2 \cdot \text{H}_2\text{O}$, may be prepared by the interaction of bismuth nitrate and ammonium carbonate." <Br.

Preparation. The 1885 Br. P. gave the following formula for the preparation of this salt, which differs from the U. S. subcarbonate of bismuth only in containing one volume less of CO_3 in its molecule:

Purified Bismuth, in small pieces,	2 ounces av.
Nitric Acid,	4 fl.ounces
Ammonium Carbonate,	6 ounces av.
Distilled Water, a sufficiency.	

"Mix the nitric acid with three ounces of distilled water and add the bismuth in successive portions. When effervescence has ceased, apply for ten minutes a temperature approaching that of ebullition, and afterwards decant the solution from any insoluble matter that may be present. Evaporate the solution until it is reduced to two fl.ounces, and add this in small quantities at a time to a cold filtered solution of the ammonium carbonate in 40 ounces of distilled water, continually stirring during admixture." Collect the precipitate on a calico filter, wash with distilled water, press and dry at a temperature not exceeding 150°F . Dose, 5 to 20 grains. (0.33 to 1.25 Gm.).

BISMUTHI CITRAS. U. S. Bismuth Citrate.

"Bismuth Citrate should yield not less than 58 percent., nor more than 60 percent., of pure bismuth oxide." <U. S.

Preparation. The U. S. P. directs this to be made by boiling 100 grammes, or 10 ounces of bismuth subnitrate, and 75 grammes, or $7\frac{1}{2}$ ounces of citric acid with 400 Cc., or 40 ounces of distilled water until a drop of the mixture yields a clear solution with ammonia water, and then adding 500 grammes, or 50 ounces of distilled water, allowing the suspended matter to deposit and washing the precipitate with distilled water, and drying at a gentle heat.

Average dose.—0.125 Gm.=125 milligrammes (2 grains).

The Br. P. 1885, directed $5\frac{1}{2}$ ounces av. of subnitrate of bismuth to be dissolved in 11 fl.ounces (or a sufficiency) of nitric acid by the aid of heat. Water is then added until the solution remains permanently slightly colored; 8 ounces av. of sodium carbonate is then dissolved in distilled water, 4 ounces av. of citric acid is added, and the solution boiled until all the gas is expelled. This solution is then added to the solution of bismuth, and the whole heated to boiling, with occasional stirring. When cold the liquid is poured off and the precipitate washed and dried over a water-bath. This is omitted from the 1898 Br. P.

Uses. This salt is seldom employed in medicine, but in pharmacy is used for preparing bismuth and ammonium citrate.

BISMUTHI ET AMMONII CITRAS. U. S.**Bismuth and Ammonium Citrate.**

"Bismuth and Ammonium Citrate should yield not less than 48 percent. of pure bismuth oxide." < U. S.

The U. S. P. directs this to be made by mixing 100 grammes, or 1 ounce of bismuth citrate with 200 grammes, or 2 ounces of distilled water and gradually adding ammonia until the salt is dissolved and the liquid has only a faint alkaline reaction. The solution is then to be evaporated to a syrupy consistence, and spread upon plates of glass to dry, so that in drying the salt may be obtained in scales.

The Br. P., 1885, process is in effect the same, the official solution of bismuth citrate and ammonium being evaporated etc., as above. This is the only soluble salt of bismuth, and in pharmacy is considerably used in making elixirs and other preparations requiring bismuth in solution. It is sometimes prescribed in powders etc., the dose being from 1 to 3 grains, (0.065 to 0.20 Gm.). This is omitted from the Br. P. 1898.

Average dose.—0.125 Gm.=125 milligrammes (2 grains).

BISMUTHI OXIDUM. Br. Bismuth Oxide.

"Bismuth oxide, Bi_2O_3 , may be prepared by boiling bismuth oxynitrate with solution of sodium hydroxide." < Br. 1898.

The Br. 1885 formula was

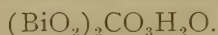
Subnitrate of Bismuth,	1 ounce av.
Solution of Soda,	5 fl.ounces

Mix and boil for five minutes, then, having allowed the mixture to cool and the oxide to subside, decant the supernatant liquid, wash the precipitate thoroughly with distilled water, and, finally, dry the oxide by the heat of a water-bath. This salt is known by the names bismuth teroxide and bismuth protoxide, or bismuthous oxide. Dose, 5 to 20 grains, (0.33 to 1.25 Gm.).

Hydrated Bismuth Oxide may be made by gradually dropping an acid solution of bismuthous nitrate into a concentrated solution of potassium hydrate (solution of potassa), entirely free from carbonic acid, washing and drying the precipitate.

Bismuth Oxide or Anhydride. Bi_2O_3 . **Bismuthic Acid.** This may be prepared by suspending bismuthous oxide in a strong solution of potassa and passing pure chlorine gas through the mixture until it is decomposed. The powder is then treated with nitric acid, washed with cold water and dried.

Uses. Bismuth oxide has similar properties and uses as the subnitrate. The dose is from 5 to 15 grains, (0.33 to 1 Gm.).

BISMUTHI SUBCARBONAS. U. S. Bismuth Subcarbonate.

"Bismuth Subcarbonate should yield not less than 90 percent. of pure bismuth oxide." <U. S.

Preparation. The present U. S. P. gives no process for preparing this salt, but it differs in composition from the bismuth carbonate of the Br. P. only in containing one more volume of CO_2 in its molecule. The process formerly official was to dissolve 2 tr. ounces of bismuth in $4\frac{1}{2}$ tr. ounces of nitric acid mixed with 4 fl.ounces of distilled water, and set aside for 24 hours; the solution was then diluted with 10 fl.ounces of distilled water, and after 24 hours filtered; 4 pints of distilled water was then added to the filtrate and the solution precipitated with 5 fl.ounces of ammonia water. The precipitate was then to be washed and dissolved in 4 tr. ounces of nitric acid diluted with 4 fl.ounces of distilled water and after 24 hours filtered; 10 tr. ounces of sodium carbonate is then to be dissolved by heat in 12 fl.ounces of distilled water, and the solution filtered and when cold the solution of bismuth nitrate gradually added to it with constant stirring. The mass is then to be washed with distilled water until the washings are tasteless, then dried on bibulous paper with gentle heat, and rubbed to a powder.

Uses. Astringent and tonic, similar to the subnitrate. Dose, 5 to 15 grains, (0.33 to 1 Gm.).

Average dose.—0.500 Gm.=500 milligrammes ($7\frac{1}{2}$ grains).

BISMUTHI SUBGALLAS. U. S. Bismuth Subgallate.

[Dermatol].

"Bismuth Subgallate should yield not less than 52 percent., nor more than 57 percent., of pure bismuth oxide." <U. S.

This preparation which has been introduced under the trade name **Dermatol**, as a substitute for iodoform and for the local treatment of eczemas, ulcers, wounds etc., is a yellowish-red, fine powder, without odor. It may be used as a dusting, either alone or combined with starch or other dilutent; or it may be mixed with glycerin, oil, collodion or other heavy liquids, or may be made into an ointment of from 10 to 25 percent., with petrolatum or lanolin, or used in the form of gauze or medicated cotton for dressing sores and wounds. It may also be administered internally.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

BISMUTHI SUBNITRAS. U. S. Bismuth Subnitrate.

Bismuthi Subnitraš. Br. Bismuth Oxynitrate.



"Bismuth Subnitrate should yield not less than 80 percent. of pure bismuth oxide." <U. S.

"Bismuth Oxynitrate is prepared by the interaction of bismuth nitrate and water." <Br.

Preparation. No process for making this salt is now given in the U. S. P., but it may be made by a former official process, which is the same as for making the bismuth subcarbonate, except that the solution of acid bismuth nitrate first made is precipitated with the solution of sodium carbonate and the second acid solution of bismuth is precipitated with ammonia water. The Br. P., 1885, directed it to be made as follows:

Purified Bismuth, in small pieces,	2 ounces av.
Nitric Acid,	4 fl.ounces
Distilled Water, a sufficiency.	

"Mix the nitric acid with three ounces of distilled water, and add the bismuth in successive portions. When effervescence has ceased, apply for ten minutes a temperature approaching that of ebullition and decant the solution from the insoluble matter that may be present. Evaporate the solution until it is reduced to 2 fl.ounces, and pour it into 80 fl.ounces of distilled water. When the precipitate which forms has subsided, decant the supernatant liquid. Wash the precipitate and dry it at a temperature not exceeding 150°F. (65°C.)." <Br. 1885.

Uses. Bismuth subnitrate is used in pharmacy as the basis of many other bismuth salts and for making various preparations. In medicine it is extensively employed as an astringent, tonic and sedative. Dose, from 5 to 15 grains, (0.33 to 1 Gm.).

Average dose.—0.500 Gm.=500 milligrammes (7½ grains).

BISMUTHI SUBSALICYLAS. U. S. Bismuth Subsalcylate.

Bismuthi Salicylas. Br. Bismuth Salicylate.

"Bismuth Subsalcylate should yield not less than 62 nor more than 64 percent. of pure bismuth oxide." <U. S.

"Bismuth Salicylate or oxysalicylate, $C_6H_4.OH.COO.BiO$, may be prepared by the interaction of bismuth nitrate and sodium salicylate." <Br.

Preparation. It may be made by dissolving bismuth nitrate in glycerin, and adding to it a concentrated solution of sodium salicylate, then collecting the precipitate. Dose, 5 to 20 grains, (0.33 to 1.25 Gm.).

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

The following compounds of bismuth not included under other headings are sometimes used in medicine:

Bismuth Agaricinate. $(C_{10}H_{28}O_5)_3Bi_2$. This is a white, tasteless powder almost insoluble in water, prepared by neutralizing a solution of agaricinic acid with bismuth subcarbonate. It is highly recommended as a remedy for intestinal catarrh and night sweats of phthisis and tuberculous diseases. Dose 5 to 15 grains.

Bismuth Colloid Oxide. Bismon. This is a reddish powder, freely soluble in water, and containing 20 percent. of bismuth equal to 22.3 percent. of bismuth oxide. It is a gastro-intestinal tonic useful in the diarrhœas of children. Dose 4 to 8 grains.

Bismuth Resorcinat. This is a compound of bismuth about 40 percent. with resorcinol. A yellowish-brown powder insoluble in water. It is given in gastric catarrh and as an intestinal antiseptic. Dose 2 to 8 grains.

Bismuth Proteinate. Bismuthose. An albumin compound of bismuth in the form of a tasteless powder containing 22 percent. of bismuth. It is insoluble in alcohol or water but soluble in alkaline solutions. It is given as an intestinal astringent and palliative, especially useful for bowel troubles of children. Dose 15 to 60 grains.

Bismuth Pyrogallate. $[C_6H_3(OH)_3O]_2BiOH$. This compound is also known as pyrogallol-bismuth, and helcosol. It is a greenish-yellow powder insoluble in ordinary liquids but soluble in acids. It contains 60 percent. of bismuth oxide. It is employed internally as an intestinal disinfectant and astringent and externally like bismuth subgallate. Dose 5 to 15 grains.

Bismuth Subbenzoate. Bismuth benzoate, basic, $Bi(C_6H_5O_2)_3 \cdot Bi(OH)_3$. This is produced by neutralizing hot solution of benzoic acid with bismuth subcarbonate and collecting the precipitate. It is employed in the same manner as iodoform as an antiseptic dressing powder and is specially useful for syphilitic ulcers.

BORON.

Symbol B; Atomic weight ($O=16$) 11.0; Sp. gr. 2.68.

The element Boron is always found in nature associated with other substances, either as boric acid or a salt of boric acid. Chemists have succeeded in obtaining an amorphous modification of boron by heating boric anhydride, B_2O_3 , with sodium, which decomposes it. The sodium salt is then washed out, leaving a dark, brown powder. A crystalline modification is made by reducing the anhydride or oxide, (B_2O_3), by the aid of aluminum at a very high temperature; then allowing it to cool. The crystals thus produced are brownish, having a luster, refracting power and hardness nearly equal to the diamond; and are only slightly oxidized at the temperature at which the diamond burns. In many respects boron resembles carbon and silicon, and is therefore classed with them chemically.

But few boron compounds are used in pharmacy, only two being official, viz., boric acid and borax or sodium borate.

It is further noticed in the Chemical Section, Part I.

ACIDUM BORICUM. U. S., Br. Boric Acid. (Boracic Acid).



Preparation. Boric acid is produced by decomposing borax with sulphuric or hydrochloric acid: 2 parts of borax are dissolved in 8 parts of boiling water, and sulphuric acid added until the solution is distinctly acid. This requires about 1 part of the acid. As the solution cools, crystals of boric acid are deposited, which may be collected and washed on a filter with a little cold water. The crystals may be further purified by dissolving in boiling water and recrystallizing. It combines with some bases, forming **borates**, and unites

with other acids to form **boro-compound salts**, as boro-tartrate of potassium etc.

Uses. Boric acid has remarkable antiseptic and preservative virtues, and is now much employed in medicine, in solution, and in powder as an antiseptic, both internally and externally. It is also used as a preservative of solutions, juices, fruits, meats, foods etc. One percent. is generally sufficient for the purpose. Alcoholic solution of boric acid burns with a green flame.

Dose, 5 to 15 grains, (0.33 to 1 Gm.).

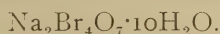
Boric Acid. H_3BO_3 . **Boracic Acid.** This is official in most pharmacopœias under the title Acidum Boricum, which see.

Metaboric Acid. HBO_2 . This is prepared by heating boric acid to $38^\circ C.$ ($100.4^\circ F.$).

Pyroboric Acid. $H_2B_4O_7$. This is made by heating boric acid for a long time to $60^\circ C.$ ($140^\circ F.$).

BORAX. Br. Borax.

Biborate of Sodium. Br. Sodium Borate. U. S.



"This salt, sodium pyroborate, occurs native. It is also made artificially by neutralizing native boric acid with sodium carbonate, or by boiling native calcium borate with solution of sodium carbonate." < Br.

It is more commonly known by its Br. title "Borax," than by the U. S. pharmaceutical name of the salt.

Borax is found in the market in prisms, generally slightly covered with an efflorescence caused by exposure to air, but transparent when the outer coating is rubbed off or when immersed in water. It is also much used in the form of powdered borax which is white and inodorous, having a slightly sweetish, alkaline taste.

It is soluble in 16 parts of water at N. T. and in 0.5 part of boiling water. It is soluble in alcohol. It contains 47.14 percent. of water of crystallization, and when heated loses a part of this water, then melts and when further heated swells into a white porous mass, and at a red heat it fuses to a colorless glass.

Borax is an alkaline salt found native in California, where immense deposits of it exist in the basins of evaporated lakes and pools. It is also obtained from Thibet, Persia, and other localities, and may be made by combining boric acid with soda.

Uses. In the industrial arts borax is extensively employed for many purposes. It is used for washing and making some kinds of soap; as a flux for refining metals and for welding etc.

In medicine it is used as an antacid and diuretic, and as a soothing and healing wash for sores, especially for sore mouth. Its solution is used in pharmacy for saponifying fixed oils, whitening ointments, and for many purposes requiring a mild alkali.

Dose, 5 to 30 grains. Br.

BORO-GLYCERIDE.

When heated with glycerin for a long time, boric acid parts with the elements of water and combines with the glycerin to form a new substance. It is made as follows:

Boric Acid, in fine powder,	62 parts
Glycerin, by weight,	92 parts

Heat the glycerin and gradually add the boric acid, continuing the heat until it no longer gives off vapor or loses weight, and until it will readily dissolve in water at ordinary temperature. The operation requires 10 to 12 hours to complete. In the earlier part of the process steam is given off freely from the water, which it set free, being vaporized; later it escapes more slowly owing to the viscosity of the melted mass.

The completed product when cool is a brittle and transparent solid of a light-amber color and a shining fracture. It dissolves freely in warm water and in 5 parts of alcohol at 120°F. (48.8°C.).

Uses. Boro-glyceride is an antiseptic, astringent, and mild escharotic. In solution it is used as a surgical dressing and injection for removing diseased mucous secretions and promoting healthy action.

BROMOFORMUM. U. S. Bromoform.

"A liquid consisting of 99 percent., by weight, of absolute Bromoform ($\text{CHBr}_3=250.99$), and 1 percent. of absolute alcohol." <U. S.

This is a colorless, volatile liquid, obtained by distilling alcohol combined with calcium bromide. Its sp. gr. is 2.80 at 25°C. (77°F.), and it boils at 305.6°F. It is similar in its properties and uses to chloroform, but is much more irritating, therefore is not much used medicinally.

BROMUM. U. S. Bromine.

Symbol Br; Atomic weight (O=16) 79.92; Sp. gr. 2.96.

"It should contain not less than 97 percent. of pure bromine, and be kept in protected glass-stoppered bottles, in a cool place." <U. S.

The element Bromine is a dense, dark-red, volatile liquid, boiling at 145.4°F. Its vapor is very irritating. It was discovered in 1826 by M. Balard, and on account of its analogies is chemically classed with chlorine and iodine. It is chiefly obtained from the mother liquor or **bittern** remaining after the crystallization of salt in salt works. It combines energetically with other elements forming salts called **bromides**, many of which are extensively used in medicine. It is further noticed in the Chemical Section, Part I.

Uses. In pharmacy bromine is used for making bromides, hydrobromic and phosphoric acids and other preparations. In medicine it is seldom used internally, but its solution is sometimes employed

as a cleansing or caustic wash, or as a gargle for diphtheria etc. Its vapor it also employed internally.

Like chlorine, it possesses wonderful bleaching properties, and is sometimes used for that purpose.

The salts formed with bromine and bases are noticed under the bases with which the combinations are formed. The following are preparations of bromine not otherwise classified:

Bromal. C_2Br_3HO . This is an aldehyde derivative prepared by the action of bromine on ethyl alcohol. It is a colorless, oily liquid, having sp. gr. 3.34, and boiling above $212^{\circ}F$. It is very irritating, therefore its use as a hypnotic or anæsthetic does not meet with favor. Combined with the elements of water it forms a hydrate known as **Bromal Hydrate**, similar in appearance and uses to chloral hydrate, but quite expensive and seldom used.

Bromalin. This is a name given to the chemical compound brom-ethylformin, prepared by the interaction of ethyl bromide upon hexamethylenetetramine. It is in white crystals, soluble in water and is used as a substitute for alkali bromides in doses of 30 to 60 grains.

Bromamide. $C_6H_2Br_3NH \cdot HBr$. This is an odorless, colorless salt, in needle-shaped crystals, insoluble in water but soluble in boiling alcohol and in ether, chloroform and the fixed oils. It is produced by the interaction of an oxygen salt of ammonia with bromine. It contains 75 percent. of bromine and is recommended as an analgesic, antipyretic and antirheumatic. The dose is from 10 to 15 grains.

Bromates are salts formed by the combination of this acid with bases. This should not be confounded with **Hydrobromic Acid**, HBr , which is a gas, the solution of which is official.

Brometone. A name given to tribrom-tertiary-butyl alcohol, prepared by the action of caustic alkali upon a mixture of bromoform and acetone. It is in fine white crystals having the odor and taste of camphor and readily soluble in alcohol, but only slightly soluble in water. It is employed as a nerve sedative and antispasmodic. Dose 5 to 10 grains.

Bromic Acid. $HBrO_3$. Made by decomposing barium bromate with sulphuric acid, filtering the liquid from the precipitate and evaporating.

Bromocoll. A compound containing 20 percent. of bromine combined with tannin and gelatin. It is given in place of the alkali bromides, and used externally in 10% solution and in the form of ointment and in suppositories and soap.

Bromol. **Tribromophenol** or **Tribromphenol.** $C_6H_2Br_3OH$. A white, crystalline substance, prepared by the action of bromine on carbolic acid in aqueous solution. It melts at $95^{\circ}C$., and is nearly insoluble in water but freely soluble in alcohol, ether, chloroform and oils, also somewhat soluble in glycerin. It may be used exter-

nally as an application to ulcers and gangrenous sores, dissolved in olive oil 1 to 30, or made into an ointment 1 to 10, or as a dusting diluted 1 to 10 with some inert substance. It is used as an application to diphtheritic patches, a 4 percent. solution in glycerin. It is also given internally in cholera infantum and typhoid conditions as a disinfectant to the alimentary canal.

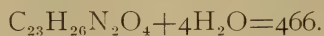
Bromopin. This is a 10 percent. solution of bromine in sesame oil. In it the unsaturated fatty acids or their glycerin esters are partially transformed by the action of the bromine into saturated fatty acids or their glycerides. It is a yellow, oily liquid, recommended as a substitute for bromides as being non-irritant and more readily assimilated. The dose is 1 to 4 fl.drachms three or four times daily.

Bromopin Solid Saccharated. This is dried bromopin in the form of tablets representing 1.2 grams of $33\frac{1}{3}$ percent. bromopin in each tablet. This is equivalent in bromine value to 0.6 gram of potassium bromide.

Bromosin. A name given to bromo-albumin, a compound of bromine and albumin containing 10 percent. of bromine. It is a yellowish-white powder used to replace alkaline bromides in certain cases. Dose 30 to 120 grains.

Some other combinations of bromine are made, as **Bromine Chloride**, **Bromine Iodide**, **Bromacetic Acid**, and other compounds with acids, but are seldom employed in pharmacy.

BRUCINUM. Brucine.



An alkaloid associated with strychnine in *nux vomica*, and obtained from some other plants of the Fam. Loganiaceæ. It possesses properties similar to strychnine, and in addition has been proven to act as a local anæsthetic, some experimenters maintaining that it is much more satisfactory than cocaine for that purpose. A 5% solution is generally employed for this purpose.

Brucine Phosphate. This salt is prepared by manufacturing chemists by dissolving brucine in dilute phosphoric acid, evaporating the solution and crystallizing.

Brucine Sulphate. This may be prepared by dissolving brucine in dilute sulphuric acid, concentrating the solution and crystallizing. Its uses are similar to the alkaloid.

BUTYL OR TETRYL.



Butyl is a gaseous radical—the fourth member of the homologous series, $\text{C}_n\text{H}_{2n+1}$, known as the alcohol radicals. It is known in pharmacy only in its compounds, as butyric ether, butyric acid etc. Commercially its alcohol, ether or acid are obtained from amylic alcohol,

rancid butter or cheese etc. Its name is derived from **butyrum** (butter), from which it was first obtained.

Its compounds with amyl and ethyl alcohols are considerably used in the manufacture of artificial fruit flavors—the butyrate of ethyl, or butyric ether, being known as **pineapple oil**. Butyric acid combines with bases to form salts known as **butyrates**.

The following are the principal combinations of butyl employed in pharmacy, and not elsewhere classified:

Butyl-Chloral. C_4H_5ClO . Made by passing dry chlorine gas into aldehyde, which forms chloral and butyl-chloral, the latter being a dense oily liquid of strong odor, which by shaking with an excess of warm water, dissolves, and upon cooling deposits **butyl chloral-hydrate**, formerly called **croton chloral-hydrate**. Butyl chloral-hydrate is employed for the same purposes as chloral-hydrate, but in considerably smaller doses.

Butyric Acid. $HC_4H_7O_2$. This is present in rancid butter and cheese, which derive from it their peculiar odor. It is also obtained by the oxidation of **butylic alcohol**, C_4H_9HO , which is usually found in crude amylic alcohol or fousel oil; and also in coal-tar. Butyric acid unites with organic radicals and metallic bases, forming **butyrates**.

Amyl Butyrate or **Butyrate of Amyl.** $C_5H_{11}C_4H_7O_2$. Made by heating together butyric acid, sulphuric acid and amylic alcohol, separating, distilling and purifying.

Ethyl Butyrate or **Butyrate of Ethyl.** $C_2H_5C_4H_7O_2$. By heating together butyric acid, sulphuric acid and alcohol, separating, distilling and purifying. This is known commercially as **butyric ether**.

BUTYRUM. Butter.

In pharmacy fresh unsalted butter is frequently used as a base for ointments, and although not official, it may often be advantageously employed. It consists of about 30 percent. of olein, 68 percent. of palmitin and stearin, and glycerides of butyric and other fatty acids. The process of making butter from cream is too well known to require description.

In medicine butter may be given as a food in place of cod liver oil. Medicines may be combined with it, or it may be made into an emulsion or jelly.

Butyrin. By heating clarified butter in a porcelain vessel for several days to $66^{\circ}C.$, separating the oily portion, mixing it with an equal weight of alcohol and agitating it frequently for 24 hours, then pouring off the oily portion, evaporating it, treating the oily residuum with a little magnesium carbonate to remove free acid, separating, heating the remaining fatty matter in alcohol, filtering and evaporating. This is the chief neutral principle of butter, and corresponds with the olein obtained from some other fats.

BUTTERINE. Artificial Butter. Oleomargarine.

Although the manufacture of butterine does not come within the province of the pharmacist, yet an outline of the process by which it is made may be of interest. Beef fat or suet is washed, cut up and melted at from 122° to 124°F. (50° to 51° Cc.). The liquid fat is drawn off, allowed to settle, strained or filtered, and kept at a temperature of from 80° to 90°F., until the stearin and the palmitin mostly crystallize out. They are then separated from the liquid portion and pressed by hydraulic pressure in a room heated to about the same temperature (80°F., 26° to 32°C.). The portion that remains liquid at this temperature consists of oleomargarine. It becomes solid when cool.

To make this into butterine, it is churned while warm with milk (80 pounds of milk to 500 pounds of oil), and colored if desired. It is then run from the churn into a trough, where it is suddenly chilled by mixing it thoroughly with pounded ice, thereby preventing it from crystallizing. It is then salted and worked like butter, and flavored usually with a little extract of tonka-bean or solution of coumarin to give it the odor of new-mown hay.

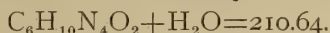
Its uses are similar to those of butter.

Pure Food Laws. In most of the states a license is required to manufacture and sell oleomargarine, or butterine by any name, and certain regulations as to coloring, packages etc., are in force.

CACHETS. Wafers.

Cachets are shallow, concave forms for containing powders. They are so made that, when prepared, they may be placed upon the tongue and swallowed by taking a drink of water.

A mixture of flour and water to which a little white of egg may be added, if desired, is prepared, of about the consistence of thick cream. This is poured upon a smooth metal plate, so that it will just cover the surface, and another metal plate is placed over it. Then it is to be baked slowly in an oven so as to evaporate all the moisture. The sheets thus obtained are cut into circular discs, with a stamp and pressed into forms so that they will have a shallow concave surface with a flat edge around it. These are placed in forms, the required powder put into them and then covered with a duplicate, the edge of which has been slightly moistened. The edges are then pressed together, in a press or by a tool, and the cachet is ready. This form of administering medicines in powdered form is very convenient, and quite popular, particularly in France. The empty cachets of different sizes and the forms for making them may be obtained of the wholesaler.

CAFFEINA. U. S., Br. Caffeine.**Theine. Guaranine. Methyl Theobromine.**

"A feebly basic substance obtained from the dried leaves of *Thea sinensis*, Linné (Fam. Ternstroemiaceæ), or from the dried seeds of *Coffea arabica*, Linné (Fam. Rubiaceæ); found in other plants." <U. S.

The Br. description is practically the same.

Preparation. Coffee, tea, some other plants, and guarana contain an identical alkaloid called caffeine. Coffee contains about 1 percent., tea 1½ to 4 percent., and guarana 4 to 5 percent. of this alkaloid. It is prepared from these substances by boiling them in water to make a strong decoction, precipitating the decoction with lead acetate to remove astringent and other matter, passing sulphuretted hydrogen gas through the filtrate to remove excess of lead, filtering again, adding ammonia water, evaporating and recrystallizing, and if necessary to make white, dissolving the crystals in hot water or alcohol, filtering through animal charcoal and again crystallizing. It is seldom made except by manufacturing chemists.

Uses. Caffeine is used as a nerve stimulant in sick and nervous headache and periodic nervous derangements. The dose is from 1 to 5 grains.

CAFFEINA CITRATA. U. S. CAFFEINÆ CITRAS. Br.**Citrated Caffeine. U. S. Caffeine Citrate. Br.**

Caffeine,	50 Gm. or 1 ounce
Citric Acid,	50 Gm. or 1 ounce
Distilled Water, hot,	100 Cc. or 2 ounces

"Dissolve the citric acid in the water and stir the caffeine into the heated solution; evaporate to dryness on a water-bath, constantly stirring towards the end of the operation. Reduce the product to a fine powder and transfer it to well-stoppered bottles." <U. S.

The Br. 1898 formula is the same.

The properties and uses of this preparation are the same as those of caffeine. The dose is from 2 to 10 grains. It may be conveniently given in the form of an elixir. It is much more soluble than the alkaloid.

CAFFEINA CITRATA EFFERVESCENS. U. S.**Effervescent Citrated Caffeine.****Caffeinæ Citras Effervescens. Br. Effervescent Caffeine Citrate.**

The U. S. P. formula is:

Citrated Caffeine,	40 Gm. or 4 ounces
Sodium Bicarbonate, dried and powdered,	570 Gm. or 57 ounces

Tartaric Acid, dried and powdered, 300 Gm. or 30 ounces

Citric Acid, uneffloresced crystals, 195 Gm. or 19½ ounces

"Powder the citric acid and mix it intimately with the citrated caffeine and tartaric acid, then thoroughly incorporate the sodium bicarbonate. Place the mixed powders on a plate of glass or in a suitable dish, in an oven heated to between 93° and 104°C. When the mixture has acquired a moist consistence, by the aid of careful manipulation with a wooden spatula, rub it through a No. 6, tinned-iron sieve, and dry the granules at a temperature not exceeding 54°C. (129.2°F.). Keep the product in well-stoppered bottles." < U. S.

Average dose.—4 Gm. (60 grains).

The Br. P. formula is:

Sodium Bicarbonate, in powder,	51 ounces or 510 Gm.
Tartaric Acid, in powder,	27 ounces or 270 Gm.
Citric Acid, in powder,	18 ounces or 180 Gm.
Refined Sugar, in powder,	14 ounces or 140 Gm.
Caffeine Citrate,	4 ounces or 40 Gm.

"Mix the caffeine citrate, tartaric acid and citric acid; with the product thoroughly incorporate the mixed sodium bicarbonate and refined sugar; place in a dish or pan of suitable form heated to between 200° and 220°F. When the mixture by the aid of careful manipulation has assumed a granular character, separate it into granules of uniform and convenient size by means of suitable sieves. Dry the granules at a temperature not exceeding 130°F. (54.4°C.). The product should weigh about 100 ounces (or 1000 Gm.). Dose 60 to 120 grains." < Br.

The foregoing formulas are given as typical of the U. S. P. and Br. P. effervescing salts, of which there are several in the pharmacopœias of both countries. They do not differ essentially in the proportion of medicinal constituents but in the dilutents and the manner of making they are considerable unlike.

Other Salts of Caffeine.

Caffeine salts may be prepared with most of the vegetable and mineral acids. Several caffeine salts are official in the Fr. and G. pharmacopœias.

Caffeine Benzoate. This may be prepared by adding caffeine to a hot saturated solution of benzoic acid until it is neutralized; then allowing it to cool and crystallize.

Caffeine Hydrobromide. $C_8H_{10}N_4O_2 \cdot HBr + H_2O = 311$. Caffeine 100 Gm., hydrochloric acid, a sufficient quantity. Dissolve the caffeine by gentle heat in an excess of concentrated hydrobromic acid, allow to cool and crystallize.

Caffeine Hydrochloride. $C_8H_{10}N_4O_2 \cdot HCl + 2H_2O = 266.5$. Caffeine 100 Gm., (or any convenient quantity), hydrochloric acid, a sufficient

quantity. Dissolve the caffeine by gentle heat in an excess of hydrochloric acid, allow to cool and crystallize.

Caffeine Salicylate. Add caffeine to a hot concentrated solution of salicylic acid until it is neutralized, then allow to cool and crystallize.

Caffeine Sulphate. Dissolve caffeine by gentle heat in an excess of sulphuric acid, and allow to cool and crystallize.

Caffeine Valerate. Add caffeine to warm valeric acid until it is neutralized, then cool and crystallize.

Caffeine and Sodium Benzoate. Dissolve caffeine 50 parts and sodium benzoate 59 parts in distilled water 200 parts, and evaporate by gentle heat to a powder.

Caffeine and Sodium Salicylate. Dissolve caffeine 550 parts and sodium salicylate 60 parts in 200 parts of water, and evaporate by gentle heat to a powder.

CALCIUM.

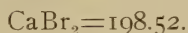
Symbol Ca; Atomic weight ($H=1$) 39.8; Sp. gr. 1.78 to 1.87.

Calcium is a strongly positive element occurring abundantly in nature as a carbonate, phosphate, silicate, chloride etc., its compounds forming a large proportion of the crust of the earth. Its oxide is calx or lime, and the salts of calcium are generally, though improperly, called salts of lime.

The metal calcium was first obtained from lime by Sir H. Davy, in 1808. It is classed with barium, strontium and magnesium. It is of a light-yellow color, rather harder than lead, very malleable and ductile, and melts at about 500°C . Its salts are very extensively used in the arts and industries, and are considerably employed in pharmacy and medicine. The salts of calcium, in solution, give a white precipitate with ammonium carbonate, and, if concentrated, with sulphuric acid also.

The following are the official salts of calcium:

CALCII BROMIDUM. U. S. Calcium Bromide.



"It should contain not less than 97 percent. of pure calcium bromide, and should be kept in well-stoppered bottles." <U. S.

Preparation. The present U. S. P. gives no formula for the preparation of this salt. The following from the 1880 U. S. P. makes a satisfactory preparation:

Hydrobromic Acid, any convenient quantity.

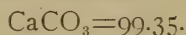
Precipitated Chalk, (calcium carbonate), a sufficiency.

Add the precipitated chalk to the hydrobromic acid, a little at a time, until a portion remains undissolved after standing for a few hours, then filter and evaporate the solution to dryness, stirring while drying to granulate the salt.

Uses. Calcium bromide is used as a hypnotic, and for nervous irritability, in doses of 20 to 60 grains, (1.25 to 4 Gm.).

CALCII CARBONAS PRÆCIPITATUS. U. S., Br.

Precipitated Calcium Carbonate. Precipitated Chalk.



"It should contain not less than 99 percent. of pure calcium carbonate." < U. S.

"The precipitate CaCO_3 , obtained by the interaction of calcium chloride and sodium carbonate." < Br.

Preparation. The following, which was formerly official, produces a satisfactory preparation:

Calcium Chloride,	5 ounces av.
Sodium Carbonate,	13 ounces av.
Boiling Distilled Water, a sufficiency.	

Dissolve the calcium chloride and the sodium carbonate each in two pints of water. Well mix the two solutions, and allow the precipitate to subside, collect on a calico filter, and wash it with boiling distilled water until the washings cease to give a precipitate with nitrate of silver and dry the product at the temperature of boiling water, 212°F . (100°C .).

Uses. This powder is more commonly known as English precipitated chalk, and is much used in tooth powders, toilet powders etc., it is also used in medicine in the form of powders, troches etc., and is frequently employed for making chalk mixture, but is not considered so good for that purpose as prepared chalk. The dose is 10 to 30 grains or more.

CRETA PRÆPARATA.

Prepared Chalk. Prepared Calcium Carbonate.

Although this substance is not classed in the pharmacopœias under the heading "Calcium," it properly belongs there, as it is "native, friable, calcium carbonate, CaCO_3 , freed from most of its impurities by elutriation."

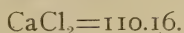
Preparation. This is prepared from common chalk, which is native, friable, calcium carbonate, by rubbing it with a little water into fine powder, then transferring it to a large vessel nearly full of water, stirring thoroughly, and, after a moment, while the supernatant liquor is still turbid, pouring it off into another vessel. The coarser particles of chalk, which remain in the first vessel, are then treated again with water in the same manner, the liquid poured off and added to the portion formerly decanted. The suspended chalk is now allowed to subside, the water poured off, and the powder dried or made into little cones or "drops" by running through a paint mill.

Uses. Prepared chalk is an antacid, used medicinally almost altogether when calcium carbonate is indicated. It is given in diar-

rhœa, acid stomach etc. Also used in making toilet powders. Dose, 10 to 30 grains of more.

Whiting is a cheap prepared chalk used for whitening walls, polishing etc.

CALCII CHLORIDUM. U. S., Br. Calcium Chloride.



"Calcium chloride rendered anhydrous by fusion at the lowest possible temperature. It should contain not less than 99 percent. of pure Calcium chloride, and should be kept in well-stoppered bottles." <U. S.

"The salt, $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$, formed by neutralizing hydrochloric acid with calcium carbonate, carefully desiccated at a temperature not exceeding 392°F . (200°C). "<Br.

Preparation. Calcium chloride may be prepared by neutralizing hydrochloric acid with chalk or marble, adding a little solution of chlorinated lime and slacked lime to the solution, filtering, evaporating the filtrate to dryness, and then heating to redness. The fused salt thus prepared is used to dry gases, and in pharmacy as the basis of other calcium salts. A solution made with it is official in the Br. P. This salt should not be mistaken for chlorinated lime, which is more frequently called "chloride of lime."

CALCII HYDRAS. Br. Calcium Hydroxide.

Hydrate of Lime. Slaked Lime.



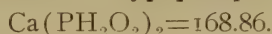
"Calcium hydroxide, $\text{Ca}(\text{HO})_2$, recently prepared by the interaction of water and calcium oxide." <Br.

Preparation. This is so common a preparation that it scarcely needs a formula, but it may not be out of place to give the Br. 1885 official directions for making it:

Lime,	2 pounds av.
Distilled Water,	20 fl.ounces

Place the lime in a metal pot, pour the water upon it, and when vapor ceases to be disengaged, cover the pot with its lid and set it aside to cool. When cool, pass through a sieve and keep in well-stoppered bottles, excluded from air. Slaked lime is used to prepare **liquor calcis**, or lime water, and **syrupus calcis**, or syrup of lime.

Calcium hydroxide is a convenient basis for many of the lime salts. It may be combined with many of the acids, forming crystalline soluble salts, or it may be added to solutions of other salts forming insoluble precipitates and freeing weaker bases or acids from their combinations. It is extensively used as a deodorant and disinfectant for absorbing noxious gases, and in disposal works where sewage is disposed of.

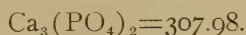
CALCII HYPOPHOSPHIS. U. S., Br.**Calcium Hypophosphite.**

"It should contain not less than 98 percent. of pure Calcium hypophosphite, and should be kept in well-stoppered bottles." <U. S.

Preparation. This salt is most conveniently prepared by heating 2 parts of calcium hydrate (slaked lime) with 1 part of phosphorus and 10 parts of water, until phosphuretted hydrogen gas ceases to be evolved, then filtering the liquid to separate insoluble matter, concentrating the filtrate by evaporation, refiltering, evaporating again until a pellicle appears on the surface; then setting aside to crystallize or continuing the heat, and stirring to granulate. In conducting this process is necessary to provide for the escape of the gas, which is inflammable, by means of a hood adjusted over the vessel in which the mixture is heated. The evaporation should also be at a low temperature, not over 185°F., (85°C.).

Uses. In pharmacy this salt is used for preparing other hypophosphites and hypophosphorous acid in syrups etc. In medicine it is employed in wasting diseases, coughs, defective nutrition, nervous anemia etc. The dose is from 5 to 30 grains, (0.33 to 2 Gm.), usually given in the form of syrup, solution or emulsion.

Average dose.—0.500 Gm.=500 milligrammes (7½ grains).

CALCII PHOSPHAS PRÆCIPITATUS. U. S.**Calcii Phosphas. Br. Calcium Phosphate.****Precipitated Calcium Phosphate.**

"It should contain not less than 99 percent. of pure Calcium Phosphate $[(\text{PO}\cdot\text{O}_3)_2\text{Ca}_3]$." <U. S.

In the Br. P. Calcium Phosphate, which is the same, is official.

Preparation. The present U. S. P. gives no formula for this preparation, the following from the 1870 U. S. P. makes a satisfactory product:

Bone Ash, powdered,	4 tr. ounces
Hydrochloric Acid,	8 tr. ounces
Ammonia Water, q. s., or	12 fl.ounces
Distilled Water, a sufficient quantity.	

Macerate the bone-ash in the hydrochloric acid, diluted with a pint of distilled water until it is dissolved, and filter the solution. Add a pint of distilled water through the filter, and then gradually add ammonia water until the liquid shows an alkaline reaction. Mix the magma (precipitate) with twice its bulk of boiling water, and pour the whole upon a calico strainer. Wash the precipitate on the strainer with boiling distilled water until the washings cease to give

a cloudiness with solution of nitrate of silver acidulated with nitric acid, and lastly, dry by gentle heat.

Uses. Precipitated calcium phosphate or phosphate of lime as it is commonly called, is used for preparing solutions of phosphates and lacto-phosphates, and many other preparations used in pharmacy; in medicine it is employed as an antacid and osseous nutritive.

Average dose.—1 Gm. (15 grains).

CALCII SULPHAS EXSICCATUS. U. S.

Exsiccated Calcium Sulphate. Plaster of Paris. Dentist's Plaster.

"A powder containing about 95 percent., by weight, of Calcium Sulphate [$\text{CaSO}_4=135.15$], and about 5 percent. of water, prepared from the purer varieties of native gypsum, by carefully heating until about three-fourths of the water has been expelled." < U. S.

The commercial Plaster of Paris answers for most purposes for which this official is employed, except for particular chemical work. It is less soluble in hot than in cold water and is insoluble in alcohol. When mixed with half its weight of water it forms a smooth cohesive mixture, which rapidly hardens; this mixture when poured into moulds fills them completely and forms a body of the same shape as the space enclosed by the moulds. Commercial Plaster of Paris is extensively used for modeling, and the official preparation is used in chemical operations.

The unofficial Calcium Salts are noticed in the Chemical Section of Part I.

CALX. U. S., Br. Lime. Calcium Oxide.

$\text{CaO}=55.68$.

"Prepared by calcining white marble or the purest varieties of native calcium carbonate, and containing, when in the anhydrous state, not less than 90 percent. of pure calcium oxide. It should be kept in well-closed vessels, in a dry place." < U. S.

Preparation. Lime is made by calcining or "burning" lime-stone, marble or chalk, thus expelling carbonic acid gas. It is an alkaline earth, much employed for building and other useful purposes, as with sand it forms a cement, the sand being partially dissolved and gelatinized by the action of the lime. In pharmacy it is extensively used in making many of the galenicals. In medicine it is somewhat employed as an escharotic, and its solution (lime-water) is extensively prescribed and used both externally and internally.

CALX CHLORINATA. U. S., Br. Chlorinated Lime.

Chlorinated Calcium Oxide. (Chloride of Lime).

"A compound resulting from the action of chlorine upon calcium hydroxide, and containing not less than 30 percent. of available chlorine. It is often improperly called Chloride of Lime." < U. S.

"A product obtained by exposing slaked lime to the action of chlorine gas until absorption ceases." <Br.

Preparation. This preparation is made by exposing slaked lime to the action of chlorine so long as the gas is absorbed. It is extensively used for bleaching and disinfecting, and is familiarly known as **bleaching powder**. Chlorinated lime should not be mistaken for chloride of calcium which is a true calcium salt.

Freshly prepared chlorinated lime contains from 30 to 35 percent. of chlorine but loses most of it by age and exposure.

Uses. In pharmacy it is used in making several preparations and is much employed as a cheap deodorizer and disinfectant. It is sometimes given internally.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

CALX SULPHURATA. U. S., Br. Sulphurated Lime.

"A mixture containing at least 60 percent. of Calcium Sulphide [$\text{CaS}=71.63$], together with unchanged calcium sulphate and carbon, in varying proportions." <U. S.

"A mixture containing not much less than 50 percent. of Calcium Sulphide, CaS , with calcium sulphate and carbon. It may be prepared by reducing native calcium sulphate by means of carbon." <Br.

Preparation. The U. S. P. gives a formula for preparing it, as follows:

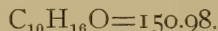
Exsiccated Calcium Sulphate,	70 Gm. or 7 ounces
Charcoal, in fine powder,	10 Gm. or 1 ounce
Starch,	2 Gm. or 88 grains

Mix the powder thoroughly, pack the mixture lightly into a crucible, cover this loosely, and heat it to bright redness, until the contents have lost their black color. Allow the crucible to cool, reduce the product to powder, and at once transfer it to small glass-stoppered vials.

Uses. This substance is used in ointments and as a depilatory for removing superfluous hair. It is given internally for skin diseases and as an alterative.

Average dose.—0.065 Gm.=65 milligrammes (1 grain).

CAMPHORA. U. S., Br. Camphor.



"The dextrogyrate modification of the saturated ketone [$\text{C}_9\text{H}_{16}\text{CO}$], obtained from *Cinnamomum Camphora* (Linné) Nees et Ebermaier (Fam. Lauraceæ), and purified by sublimation. Camphor should be kept in well-closed vessels, in a cool place." <U. S.

"A white crystalline substance obtained from *Cinnamomum Camphora*, purified by sublimation." <Br.

Camphor is official in all countries, the process for preparing it is given in Part I. It is imported in its crude state chiefly from Japan and China, and refined in the U. S. or Europe. Native or crude camphor is never found in the stores, only the refined being used as medicine. For further description see Part I.

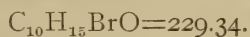
It is but slightly soluble in water, but dissolves readily in alcohol, ether, chloroform, benzin, oil of turpentine and fixed oils. Its sp. gr. is 0.990 at 25°C. (77°F.).

When camphor is triturated in about molecular proportions with menthol, thymol, phenol or hydrated chloral a liquid is produced. To powder camphor add a very little alcohol to lumps of it contained in a mortar and rub to a powder.

It is considerably used in medicine as a sedative and as a stimulant and diaphoretic. It is an ingredient in many medicinal preparations in various forms for external and internal use.

Average dose.—0.125 Gm.=125 milligrammes (2 grains).

CAMPORA MONOBROMATA. U. S. Monobromated Camphor.



"A substitution product of camphor [$\text{C}_9\text{H}_{15}\text{Br}\cdot\text{CO}$]." <U. S.

Preparation. This bromine compound of camphor may be prepared by introducing bromine 4 ounces, gradually into a retort containing camphor 13 ounces. After 15 to 20 minutes reaction begins, and when this ceases 8 or 9 ounces more of bromine is added in four portions, giving time between each addition for the reaction to occur and subside. Finally the retort is to be heated to about 132°C. (270°F.), then cooled and sufficient benzin added to dissolve the crystalline mass. Crystals form upon cooling, which may be removed and purified by allowing to dry, then dissolving in hot alcohol and recrystallizing. Other methods of manufacture are employed by some chemists but the resultant preparation is the same.

Uses. This compound is used as a nervous sedative in hysteria, epilepsy and convulsions caused by nervous irritation, and has been highly recommended in the treatment of delirium tremens. It is also claimed that it is valuable in the treatment of spermatorrhœa. It may be given in the form of powder or in pills or capsules, and in mixtures and emulsions. It is insoluble in water, but freely soluble in alcohol, ether, chloroform, benzin and oils.

Average dose.—0.125 Gm.=125 milligrammes (2 grains).

CAPSULES.

Capsules are small cylindrical or oval receptacles for holding medicines, usually made of gelatin and combined with some adhesive substance. Filled capsules are those in which oil, oleo-resin, liquid balsam or alcoholic extract or tincture are enclosed and sealed in an oval

capsule of gelatin. Empty capsules are those in which powders or masses may be enclosed. They are made in two parts, the receptacle, and the cap which slips over it; and are made in a number of sizes.

To make capsules requires the proper outfit of moulds and conveniences. They are generally supplied by manufacturers at very reasonable prices. The following formulas are submitted for the solutions from which capsules are generally made:

For Hard Capsules.

White Gelatin,	25 parts
Glycerin,	10 parts
Sugar, in powder,	8 parts
Distilled Water,	45 parts

Soften the gelatin with a part of the water and dissolve by heat, add the sugar and the glycerin and incorporate them well together. <Fr. C.

This solution may be used for making empty capsules or for the shells used for filled capsules.

For Soft or Elastic Capsules.

White Gelatin,	50 parts
Gum Arabic,	15 parts
Sugar, in powder,	15 parts
Distilled Water,	80 parts
Glycerin,	12 parts

Soften the gelatin and dissolve in a portion of the water by the aid of heat, dissolve the gum arabic in the remainder of the water, add the glycerin and sugar, and mix the glycerin with the hot solution of gelatin.

The gelacacia coating, for which a formula is given under "Pills," is suitable for this purpose. This solution is particularly adapted for making the soft or elastic shells for filled capsules.

Capsule filling machines, with which empty capsules may be conveniently filled with powder, may be had of dealers in pharmaceutical apparatus.

CARBO. CARBON.

Symbol C; Atomic weight 11.97.

Carbon is one of the most important and widely distributed elements. It exists in nature in a great variety of forms, differing widely in appearance and characteristics. The diamond and graphite are familiar forms of crystallized carbon; lamp-black and wood charcoal are forms of impure amorphous carbon. It is a constituent of all animal and vegetable substances, and has therefore been called the "organic element." It is present in all alkaloids and neutral principles of plants, and its compounds include the greater part of the substances most valuable in pharmacy and medicine. Carbon and its various

forms and compounds are more fully described in the Chemical Section, Part I.

CARBO ANIMALIS. U. S. Animal Charcoal.

"Charcoal prepared from bone." < U. S.

Preparation. Animal charcoal is known commercially as **ivory-black** or **bone-black**, and is prepared in a large way by first boiling bones in water to free them from fat and adhering particles, and then subjecting them to destructive distillation in iron cylinders, by which process they are deprived of their volatile portions, as ammoniacal liquor, or **bone spirit** and tar, or **bone oil**, and become charred, consisting mainly of carbon and calcium salts.

Uses. Animal charcoal is extensively used for decolorizing substances by filtering them through it, especially for refining sugar, making petrolatum etc., also for making blacking for shoes and as a pigment. For pharmaceutical use, purified animal charcoal should be used.

CARBO ANIMALIS PURIFICATUS. U. S.

Purified Animal Charcoal.

Animal Charcoal, 100 Gm. or 10 ounces av.

Hydrochloric Acid, 300 Gm. or 30 ounces av.

Boiling Water, a sufficient quantity.

"Introduce the animal charcoal into a capacious vessel, add 200 grammes (or 20 ounces av.) of hydrochloric acid and 400 Cc. (or 40 ounces) of boiling water, adding water occasionally to maintain the original volume. By means of a sand-bath keep the mixture gently boiling during 8 hours, then add 500 Cc. (or 50 ounces) of boiling water, transfer the mixture to a muslin strainer, and when the liquid has run off, return the charcoal to the vessel. Add to it 100 Gm. (or 10 ounces) of hydrochloric acid and 200 Cc. (or 20 ounces) of boiling water, boil for two hours; again add 500 Cc. (or 50 ounces) of boiling water, transfer the whole to a plain filter, and when the liquid has passed through, wash the residue with boiling water until the washings produce only a faint cloudiness with silver nitrate test solution. Dry the powder in a drying oven, and immediately transfer it to well-stoppered vials." < U. S.

Uses. Thus treated, the crude bone-black becomes pure carbon, which may be used for delicate chemical or pharmaceutical operations. It is chiefly used for decolorizing solutions of alkaloids and fine chemicals.

CARBO LIGNI. U. S., Br. Charcoal. Wood Charcoal.

"Charcoal prepared from soft wood and very finely powdered. It should be kept in well-closed vessels." < U. S.

"The carbonaceous residue of wood charred by exposure to a red heat without access of air." <Br.

Preparation. Prepared for commerce by charcoal burners, who pile billets of wood in conical form, cover the pile with earth, ignite it from the bottom, then close it from access of air, leaving the process to go on without consuming the wood, which is by the heat deprived of its oxygen, hydrogen etc., leaving charcoal or carbon as the result of the operation.

Uses. For pharmaceutical use charcoal prepared from willow is preferred. In pharmacy, powdered charcoal is used for filtering many substances that cannot be made clear by ordinary filtering processes. It is also used in tooth powders. In medicine it is given in doses of one or two drachms, in powder or tablets, as an antiseptic and absorbent, especially in gastric derangements. On account of its absorbent qualities it should be kept in tight tin cans or bottles.

CARBONEI DISULPHIDUM. U. S. Carbon Disulphide.

Carbonis Bisulphidum. Br. Carbon Bisulphide.

$\text{CS}_2=75.57.$

"Carbon Disulphide should be kept in partially filled, well-stoppered bottles, or in tin cans, in a cool place, remote from lights or fire." <U. S.

"Carbon Bisulphide may be prepared by the combination of carbon and sulphur at a high temperature, the product being subsequently condensed and purified." <Br.

This is a clear, colorless, very volatile and inflammable liquid, having sp. gr. 1.256 to 1.257 at 25°C. (77°F.).

Preparation. It is made by combining the vapor of sulphur with carbon, collecting the gaseous product by means of condensing tubes, agitating the liquid with mercury, and distilling it in contact with white wax. Crude disulphide of carbon has a very disagreeable odor, like rotten eggs, but this may be almost entirely removed by repeated rectification. It is never prepared except by manufacturing chemists who have appropriate apparatus for making it.

Uses. Carbon disulphide is a powerful solvent of fats, resins, rubber etc., and is used in pharmacy chiefly for that purpose. Its vapor is sometimes used in the form of a spray in surgical operations, but is not administered internally. It is also a powerful antiseptic, and is used to preserve animal and vegetable substances.

CATAPLASMA KAOLINI. U. S. Cataplasm of Kaolin.

This is official in the U. S. P., 8th revision.

Kaolin, in very fine powder,

577 Gm. or 20 oz. av. + 154 grains

Boric Acid, in very fine powder,

45 Gm. or 1 oz. av. + 257 grains

Thymol,	0.5 Gm. or 8 grains
Methyl Salicylate,	2 Gm. or 30 grains
Oil of Peppermint,	0.5 Gm. or 8 grains
Glycerin,	375 Gm. or 13 oz. av.+100 grains
To make	1000 Gm. or 35 oz. av.+120 grains

The kaolin is to be heated for one hour in a suitable vessel to 100°C. (212°F.), stirring occasionally; when cool the boric acid is to be added and the mixture incorporated with the glycerin. Finally the oil of peppermint and methyl salicylate are to be mixed; the thymol dissolved in the oil and the liquid incorporated thoroughly to make a homogeneous mass. It should be kept in air-tight containers.

Uses. This new official is intended to take the place of several proprietary and semi-proprietary preparations that have lately come into considerable use as absorbents and antiphlogistics. Like antiphlogistine it is applied to the affected parts in the same manner as a poultice.

CERÆ — WAXES.

Certain peculiar substances called Wax, are produced by bees, and obtained from the fruit or leaves of plants, or from petroleum oils, or mineral deposits in various parts of the world. These waxes that occur naturally are described in the Materia Medica Section of Part I. Only white and yellow beeswax and paraffin are official in the U. S. and Br. Ph.

CERA ALBA. U. S., Br. White Wax. White Beeswax.

"Yellow wax, bleached." <U. S.

"Yellow Beeswax which has been bleached by exposure to moisture, air and light." <Br.

For further description see Part I.

CERA FLAVA. U. S., Br. Yellow Wax. Yellow Beeswax.

"A solid substance prepared from the honey-comb of the bee, *Apis mellifera*, Linné." <U. S.

"Prepared from the honeycomb of the Hive Bee, *Apis mellifica*, Linn." <Br.

The specific gravity of beeswax is 0.951 to 0.960 at 25°C. (77°F.). Its melting point is 62° to 64°C. (143.6° to 147.2°F.).

Uses. In pharmacy beeswax, either white or yellow, is used as an ingredient of cerates and ointments. It is also used in making many kinds of wax not employed in medicine, but used for various purposes.

CERATA — CERATES.

Cerates are preparations composed of wax combined with fatty or resinous substances, and intended to be spread upon lint, linen or other similar material to be used externally.

They are of firmer consistence than ointments, and are mostly designed rather to protect the parts to which they are applied, than to be absorbed, as is expected of ointments.

The British and German Pharmacopœias make no class distinction between cerates and ointments, but such a classification seems quite proper when the difference in the uses to which they are applied is considered.

The use of lard in some of the cerates, which has formerly been common, although still retained in the official formulas, has been partly superseded by petrolatum, because of its better keeping qualities and general adaptability to the purpose.

To secure uniformity of the mass, and prevent granulation of the wax, most of the cerates are stirred while cooling. This also makes them whiter and lighter as regards their specific gravity, by introducing air.

Paraffin is sometimes used instead of beeswax in making cerates, but does not make so satisfactory a preparation.

The following are the formulas official in the U. S. P.

CERATUM. U. S. Cerate.

White Wax,	300 Gm. or 3 ounces
White Petrolatum,	200 Gm. or 2 ounces
Benzoinated Lard,	500 Gm. or 5 ounces

"Melt the white wax and the white petrolatum, then the benzoinated lard, continuing the heat until the mixture is liquified, and stir it constantly until it congeals.

For use in southern latitudes, and during the heated season in other localities, 50 Gm. (or $\frac{1}{2}$ ounce) of benzoinated lard may be replaced by an equal quantity of white wax." < U. S.

Uses. This is the base commonly known as "Simple Cerate," with which medicinal substances are incorporated when desired to be used in cerate form. It is also used as a simple dressing for sores etc.

CERATUM CAMPHORÆ. U. S. Camphor Cerate.

Camphor Liniment,	100 Gm. or 1 ounce
White Wax,	350 Gm. or $3\frac{1}{2}$ ounces
White Petrolatum,	150 Gm. or $1\frac{1}{2}$ ounces
Benzoinated Lard,	400 Gm. or 4 ounces

"Melt the white wax, add the white petrolatum, then the benzoinated lard, and continue the heat until the mixture is liquified. While the mixture is cooling, add the camphor liniment and incorporate thoroughly by stirring until it congeals." < U. S.

Uses. In pharmacy camphor cerate is used for making several other cerates, and is quite frequently prescribed under its official title.

CERATUM CANTHARIDIS. U. S. Cantharides Cerate.**Blistering Cerate. "Blistering Plaster."**

Cantharides, in No. 60 powder,	320 Gm. or 8 ounces
Liquid Petrolatum,	150 Gm. or 3¾ ounces
Yellow Wax,	180 Gm. or 4½ ounces
Rosin,	180 Gm. or 4½ ounces
Lard,	170 Gm. or 4¼ ounces

"Mix the cantharides with the liquid petrolatum, and set the mixture aside, well covered, in a warm place, for 48 hours. Then add the rosin, yellow wax and lard, previously melted and strained through muslin, and keep the mixture in a liquid condition by means of a water-bath, stirring occasionally, for one hour. Finally, remove it from the bath, and stir the mixture until it begins to congeal." <U. S.

This is familiarly known as "Blister Plaster." In the Br. P. a similar preparation is given under the name *Emplastrum Cantharidis*, which see.

Uses. Cantharides cerate is used in pharmacy, in combination with Burgundy pitch for making Warming plaster, and in other irritating plasters and ointments. In medicine "Blister plaster" is an old time remedy. It may be applied, spread on thick paper, cloth or skin.

CERATUM PLUMBI SUBACETATIS. U. S.**Cerate of Lead Subacetate.**

Solution of Lead Subacetate,	20 Gm. or 2 ounces
Wool-Fat,	20 Gm. or 2 ounces
Paraffin,	20 Gm. or 2 ounces
White Petrolatum,	38 Gm. or 3 oz.+350 grains
Camphor,	2 Gm. or 87½ grains

"To the melted wool-fat in a warm mortar gradually add the solution of lead subacetate, and incorporate it by slow trituration. To the mixture add the white petrolatum and paraffin, previously melted, and in which the camphor has been dissolved. Mix thoroughly until homogeneous." <U. S.

CERATUM RESINÆ. U. S. Rosin Cerate.**Basilicon Ointment.**

Rosin,	350 Gm. or 3½ ounces
Yellow Wax,	150 Gm. or 1½ ounces
Lard,	500 Gm. or 5 ounces

"Melt the rosin, add the yellow wax and the lard, and continue the heat until liquified, then strain the liquid through muslin, and allow it to congeal with occasional stirring. In cold weather 530 Gm. (or 5.3 ounces) of lard, and 120 Gm. (or 1.2 ounces) of yellow wax may be used." <U. S.

Uses. This cerate is used in pharmacy for the preparation of turpentine liniment, and as the basis of several compound cerates which are prescribed by physicians. It is stimulating and healing.

CERATUM RESINÆ COMPOSITUM. U. S.

Compound Rosin Cerate.

Rosin,	225 Gm. or 2¼ ounces
Yellow Wax,	225 Gm. or 2¼ ounces
Prepared Suet,	300 Gm. or 3 ounces
Turpentine, (Gum Thus),	115 Gm. or 1 oz.+65 grains
Linseed Oil,	135 Gm. or 1 oz.+153 grains

"Melt the rosin, yellow wax, turpentine and prepared suet; to this add the linseed oil, and continue the heat until the mixture is liquified; then strain it through coarse muslin, and stir it until it begins to congeal." <U. S.

Uses. The uses of this are similar to the simple rosin cerate, but it is more stimulating.

CEREOLI. Ph. Ger. Arzneistäbchen. (Bougies).

These are long, slim, cylindrical, elastic sticks or rods, made for insertion into certain canals of the body. They may be made soluble and contain the medicament, incorporated with the mass from which they are prepared, or may only have the medicine applied on the outside as a coating or varnish. They are known in this country as **Bougies**, and although they are not official, they are a convenient form of local medication. They may be prepared in suitable moulds which can be had of dealers in pharmaceutical apparatus.

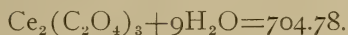
The mass with which the medicine may be incorporated may be of gum arabic or gelatin with glycerin and water, which readily dissolves salts etc., or may be of cacao butter, stearin or other fatty substances which will readily dissolve oils or other substances that will not mix in a mass in which water or glycerin has been used.

A considerable number of preparations known as bougies are made, but only a few have received official recognition.

CERIUM.

Symbol Ce; Atomic weight 139.9; Sp. gr. 6.68.

This element was discovered by Bunsen in 1860. It is found in the mineral cerite. It is of a chocolate-brown color, and is classed chemically with aluminum, cadmium and zinc. It unites with acids to form salts, the oxalate only being official. This element and its salts are more fully described in the Chemical Section, Part I.

CERII OXALAS. U. S., Br. Cerium Oxalate.

"Cerium Oxalate consists chiefly of a mixture of the oxalates of cerium, didymium and lanthanum, and of other rare earths of this group." <U. S.

"Cerium Oxalate may be obtained by interaction of a soluble cerium salt and a soluble oxalate. It usually contains some lanthanum oxalate and didymium oxalate." <Br.

It is a fine, white powder, permanent in the air, insoluble in water, alcohol and ether.

Preparation. The powdered mineral cerite, which consists of silicates of several metals, is treated with strong sulphuric acid or hydrochloric acid by the aid of heat, to separate the silica. Ammonia is then added to the filtered diluted solution, and the precipitated hydrates are again treated with acids to separate other metals. The cerium compounds are then precipitated with oxalic acid, the precipitate consisting of oxalates of cerium, lanthanum and didymium which are very difficult to separate, therefore the official salt contains all three metals.

Uses. This salt of cerium is the only one official. It is considerably prescribed in the nausea and vomiting of pregnancy and for sea-sickness or car-sickness.

Average dose.—0.065 Gm.=milligrammes (1 grain).

CHARTÆ — PAPERS.

In pharmacy a few medicinally prepared papers are used for various purposes, but only one—Charta Sinapis—is official in the U. S. and Br. P. This paper is usually prepared by manufacturing pharmacists and is put up in packages known to the trade as "Mustard Leaves."

CHARTA SINAPIS. U. S., Br. Mustard Plaster.

The U. S. P. formula is:

Black Mustard, in No. 60 powder,	100 Gm. or 10 ounces
Rubber,	10 Gm. or 1 ounce
Petroleum Benzin,	
Carbon Disulphide, each a sufficient quantity.	

"Pack the black mustard in a conical percolator, and gradually pour petroleum benzin upon it until the percolate ceases to produce a permanent stain upon blotting paper. Remove the powder from the percolator and dry it by exposure to the air. Having meanwhile dissolved the rubber in a mixture of 1000 Cc. (or 10 ounces) each of petroleum benzin and carbon disulphide; mix the purified mustard with a sufficient quantity of the solution to produce a semi-liquid magma and apply this, by means of a suitable brush, to one side of

a piece of rather thick, well-sized paper, so as to cover it completely, then allow the surface to dry.

A surface of sixty square centimeters should contain about 4 Gm. of black mustard deprived of oil.

Before it is applied to the skin, mustard paper should be dipped in warm water for about 15 seconds." <U. S.

The Br. P. formula is:

Black and white mustard seeds, equal proportions by weight,
Benzol,

Solution of India-rubber, of each a sufficient quantity.

The mustard seeds are to be bruised and percolated with benzol to remove the fixed oil, then dried and reduced to No. 60 powder. Seventy-five grains (or 5 Gm.) of this powder is then to be mixed with 5 fl.drachms (or 18 Cc.) of solution of India-rubber and spread by means of a suitable brush over about 30 square inches (or about 2 square decimeters) of one side of a piece of cartridge paper, and allowed to dry by exposure to air.

Uses. Mustard paper is much used as a counter-irritant in neuralgia, pain and many other conditions. It takes the place of the old "mustard plaster" so well known as a domestic remedy.

Other Papers.

In European pharmacopœias several formulas are given for medicated papers, but as they are little used in the U. S. they are not repeated here. The following, which is official in most countries, was in the U. S. P., 1890:

Charta Potasii Nitratis. Potassium Nitrate Paper.

Potassium Nitrate, 200 Gm. or 2 ounces
Distilled Water, 800 Gm. or 8 ounces

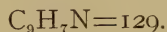
"Dissolve the potassium nitrate in the distilled water. Immerse strips of white, unsized paper in the solution, and dry them." <U. S., 1890.

This paper is chiefly used to ignite asthma powder. The powder is placed upon it, the paper ignited and the smoke inhaled by the patient.

CHININUM. Quinine.

In countries of the German Empire, Italy, Rome and Sweden, Quinine is called Chininum, and its compounds and salts by titles corresponding to this basic name; as chininum hydrochloricum, chininum sulfuricum etc. Many of the compound salts of quinine of German origin are known in the market by the name China- or Chino- combined with the name indicating the substance with which it is combined. In this work these combinations are included with the quinine salts and combinations.

CHINOLINA. Chinoline. Quinoline. Leucoline.



This is a colorless, liquid artificial alkaloid, prepared by the destructive distillation of quinine or cinchonine with potassium hydroxide; or it may be prepared synthetically by the action of sulphuric acid and glycerin upon a mixture of nitrobenzol and aniline. Its sp. gr. is 1.093 to 1.096, and its boiling point 225° to 227°C. It is slightly soluble in water and freely soluble in alcohol. Chinoline is antiseptic, antizymotic and antipyretic, and is the basis of a number of com-

pounds that have been recently introduced as analgesics and antipyretics. Its antiseptic properties make it a valuable preservative, and it is used in connection with some other substances to preserve anatomical specimens.

Chinoline is not given internally, but several of its salts are considerably used and prescribed.

Chinoline Bisulphate. This is prepared by treating chinoline with an excess of sulphuric acid and crystallizing. It is somewhat used in place of quinine bisulphate.

Chinoline Hydrochloride. Prepared by acting upon chinoline with hydrochloric acid and crystallizing. This may be used the same as quinine hydrochloride.

Chinoline Mono-Hypochloride. **Chinol.** C_9H_6NCl . This is an odorless, white, crystalline powder, almost insoluble in water, but readily soluble in alcohol. It has had some sale as an antipyretic under the proprietary name "chinol." It is similar in its effects to antipyrine, but is given in much smaller doses, 3 to 5 grains.

Chinoline Ortho-ethoxy-anamobenzoylamide. **Analgen.** This compound is derived from chinoline by chemical reactions. It is a crystalline substance soluble in hot alcohol, but insoluble in water. It is recommended as an antipyretic, antirheumatic and analgesic, and is given in doses of from 5 to 7 grains every 3 or 4 hours, not exceeding 75 grains per day.

Chinoline Phenolsulphone. This is made by uniting two molecules of oxychinolin, $C_9H_6N(OH)$, with one molecule of phenol-sulphonic acid, $C_6H_5(HSO_3)OH$. It is in yellowish crystals, very soluble in water and diluted alcohol, melting at $85^\circ C$. It is decomposed in alkaline solutions.

This is claimed to be a much more powerful antiseptic than carbolic acid, and that it is not poisonous nor irritating. It is said to be especially useful in solution for diphtheria and all forms of disease produced by bacilli, and in surgery in the treatment of wounds, sores etc. It may also be given internally in 5 percent. solution in doses of a fluid drachm for an adult.

Chinoline Salicylate. This may be prepared by acting upon chinoline with a hot alcoholic solution of salicylic acid and allowing the solution to cool and crystallize. This is recommended for rheumatism and rheumatic fever. It is soluble in 8 parts of water and in glycerin, alcohol, ether and oils.

Chinoline Tannate. Prepared by adding tannic acid to warm chinoline until saturated, then cooling and crystallizing.

Chinoline Tartrate. This is the most useful of the chinoline salts and forms in definite crystals. It is soluble in 70 to 80 parts of cold water and freely in alcohol. It is given in whooping cough, $1\frac{1}{2}$ grains every 3 hours; and in intermittent fever, 5 grains every 3 hours

for 12 hours before the chill. This salt is also used as a preservative of anatomical specimens. (See Preservatives).

CHLORALFORMAMIDUM. U. S. Chloralformamide.



"A crystalline solid [$\text{CCl}_3\cdot\text{CH}(\text{OH})\text{NH}\cdot\text{COH}$], made by the direct union of formamide with anhydrous chloral. It should be kept in amber-colored, well-stoppered vials." < U. S.

This compound has been known to the trade for many years as **Chloralamide**. It is soluble in about 18.7 parts of water and in 1.3 parts of alcohol at 25°C. (77°F.); readily soluble in ether, glycerin, acetone and acetic ether.

Uses. It is used in medicine chiefly as a hypnotic and nerve sedative.

Average dose.—1 Gm. (15 grains).

CHLORALUM HYDRATUM. U. S. Hydrated Chloral.

Chloral Hydras. Br. Chloral Hydrate.



"A crystalline solid, composed of trichloraldehyde or chloral [$\text{CCl}_3\cdot\text{COH}$] with the elements of one molecule of water. It should be kept in glass-stoppered bottles, in a cool and dark place." < U. S.

"Chloral Hydrate or trichlorethylidene glycol, $\text{CCl}_3\cdot\text{CH}(\text{OH})_2$, is obtained by the action of dry chlorine gas on ethylic alcohol." < Br.

Preparation. Chloral is prepared by manufacturing chemists, by passing dry chlorine gas for several weeks into absolute alcohol contained in a suitable vessel until it becomes a thick, oily liquid of sp. gr. 1.502. At first the alcohol is cooled by surrounding the vessel with ice to prevent explosion, but when no more will be absorbed towards the end of the operation, it is heated to nearly the boiling point, 60°C. (140°F.). The liquid thus obtained is chloral. To purify it is agitated with four times its bulk of concentrated sulphuric acid for several hours at a temperature of 60°C. (140°F.), most of the hydrochloric acid escaping. The chloral then separates as an oily layer on top, and is further purified by distilling over calcium carbonate. This is pure anhydrous chloral.

To make Hydrated Chloral this is mixed in glass vessels with the required quantity of water, and allowed to solidify into a cake or "crust." This may be further purified by dissolving in chloroform, benzin or ethyriden chloride, and crystallizing. It is mostly used at present in the crystallized form. Chemically, chloral is an aldehyde derivative known as trichloraldehyde.

Uses. Hydrated chloral is a hypnotic, used in delirium, nervous irritability etc. The dose is from 10 to 30 grains, usually given in flavored syrup, as syrup of ginger or orange.

Average dose.—1 Gm. (15 grains).

The following compounds of chloral are more or less used in medicine:

Camphor Chloral. When hydrated chloral and camphor in nearly equal quantities are rubbed together in a mortar, the two solids unite and form a syrupy liquid which is often employed for toothache, facial neuralgia, and other painful affections. It may be made as follows:

Camphor,	4 parts or drachms
Hydrated Chloral,	4 parts or drachms

Rub the camphor, by the aid of a few drops of alcohol, to a powder and add the hydrated chloral, rubbing them together until they become liquid.

This may be diluted if desired by mixing it with alcohol and glycerin equal parts. When thus prepared, it may be used as an anodyne application or liniment, or may be given internally.

Chloralamide. Chloral Formamide. This is prepared by the interaction of anhydrous chloral and formamide. It is lustrous, colorless crystals, without odor and has a slightly bitter taste. It melts at 115° C., and is decomposed at a higher temperature. It dissolves slowly in 20 parts of water or in 1.5 parts of alcohol. It is considered one of the most valuable hypnotics, and is extensively used in nervous strain or tension caused by pain, excitement, overwork or alcoholic indulgence. It has no bad after effects like most hypnotics. It can be made up in the form of an elixir. The dose of chloralamide is from 15 to 40 grains. It should be given in dilute solution. It is also given by hypodermic injection. It is quite different from chloralimide, which see.

This is now official in the U. S. P. under the title Chloralformamidum, which see.

Chloral-Ammonium. $\text{CCl}_3\text{CH}(\text{NH}_2)\text{OH}$. A white, crystalline powder, soluble in water; has been recommended as a hypnotic in doses of from 15 to 30 grains. It is said to combine the properties of urethane and chloral-hydrate.

Chloral-Camphor. This is the same as camphor chloral. It is used in neuralgia by painting it on with a brush or rubbing it over the affected part, also for toothache, local pain etc.

Chloral-Carbamide. Prepared by rubbing together in a mortar 331 grains of hydrated chloral and 120 grains of carbamide (urea), making a liquid, this is then dissolved in 1 fl.ounce of hot water and when cool a crystalline mass, which is the chloral carbamide, results. This is employed for the same purposes in medicine as chloral, the dose being from 15 to 30 grains.

Chloral-Carbol. Hydrated chloral 3 parts, phenol 4 parts, are rubbed together in a mortar and form a liquid which is soluble in all proportions in water, alcohol, glycerin or ether. It is a local anæsthetic and counter-irritant used for neuralgia etc. It makes a good toothache remedy.

Chloralimide. CCl_3CHNH . This must not be confounded with chloralamide, which is quite a different preparation. This is in long crystalline needles, without color or taste, and is prepared by heating chloral-ammonium. It is a powerful antipyretic and analgesic. The dose is 3 to 7 grains.

Chloral-Menthol. Hydrated chloral and menthol are heated together on a water-bath until they form an oily liquid; freely soluble in alcohol, chloroform and benzin. It may be used as a remedy for neuralgia, toothache and pain.

Chloral-Urethane. Uralium. $\text{CCl}_3\text{CHOHNHCO}_2\text{C}_2\text{H}$. This compound is prepared from chloral and urethane by a complicated process. It is highly recommended as a hypnotic, being safer and more effective than hydrated chloral. It is given in doses of 15 to 30 grains.

Somnal. This is a saturated alcoholic solution of chloral-urethane. Other chloral preparations will be found under other headings.

CHLORETONE. Acetone Chloroform.

This is, chemically, tertiary trichlobutyl alcohol, $\text{C}_4\text{H}_7\text{OCl}_3$, produced by the action of acetone on chloroform. It is also called **Chlorbutanol**. This is not a liquid as might be inferred from its name, acetone chloroform, but is a white, volatile, crystalline powder having the taste and odor of camphor, soluble in alcohol, ether, chloroform or glycerin, but sparingly soluble in water. It is used in concentrated aqueous solution as a local anesthetic, and is given internally as an anodyne and nerve sedative. It is also used as a preservative of medicinal solutions. Dose 5 to 20 grains.

CHLORINE.

Symbol Cl; Atomic weight ($\text{O}=16$) 35.46.

Chlorine is a gaseous element of greenish-yellow color and suffocating odor. Its sp. gr. is 2.45 compared with air as 1. It was discovered by Scheele in 1774, and was, later on, classed with the elements, and named from its color by Davy.

Chlorine combines with every other element except fluorine, and is, therefore, of great interest and importance. It possesses wonderful bleaching properties and is largely used in the arts for this purpose. It is also a powerful disinfectant. Its compounds with the alkali metals are of great industrial value and application, and its salts form a large class of chemicals useful in pharmacy and medicine. It combines with other elements forming chlorides, and in combination with oxyacids unites with bases, forming chlorates and perchlorates.

Chlorine may be obtained by heating hydrochloric acid with peroxide of manganese in a flask and collecting the gas, but is prepared commercially in apparatus specially constructed for the purpose. It is more fully described in the Chemical Section, Part I.

The only preparation in which uncombined chlorine is exhibited is in chlorine water, which is a solution of the gas official in the U. S. P. under the title *Liquor Chlorig Compositus*.

Acids of Chlorine.

Hypochlorous Acid. HClO . This may be prepared by agitating chlorine water with red precipitate, and distilling the liquid to separate the solution of the gas from mercury chloride, which results from the reaction:

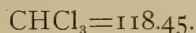
Chlorous Acid. HClO_2 . Made by heating together in a glass flask on a water-bath, potassium chlorate 4 parts, arsenic 3 parts, nitric acid 12 parts, water 4 parts. The gas generated by the operation is conducted by a bent tube into a receiver containing water. It is a great bleaching and oxydizing agent.

Chloric Acid. HClO_3 . This may be made by decomposing barium chlorate with an equivalent quantity of pure diluted sulphuric acid, and evaporating the liquid poured off from the precipitate, in vacuo, over strong sulphuric acid. Although this is the acid basis of the chlorates, it is seldom used in pharmacy.

Hydrochloric Acid. HCl . This is the only known compound of hydrogen and chlorine. It was formerly called Muriatic Acid. It is obtained chiefly as a by-product in the manufacture of soda-ash from common salt by heating it to a high temperature with sulphuric acid, by which process sodium sulphate is formed, and hydrochloric acid liberated in the form of gas; this is then purified and dissolved in water by various methods, forming the hydrochloric acid of commerce, which contains 31.9 percent. of the gaseous acid. It is frequently called for as "Spirit of Salt," or some similar title. It is the acid basis of the chlorides, and is much used in pharmacy and the arts. (See Acidum Hydrochloricum).

Perchloric Acid. HClO_4 . By distilling dry potassium chlorate with 4 times its weight of boiled, concentrated sulphuric acid, and collecting the distillate.

Besides the combinations of hydrogen and oxygen with chlorine, it forms compounds with some other acids, as Chloracetic Acid, Chlorochromic Acid, CrOCl , Chlorocarbonic Acid, COCl_2 , etc., and with elements as Chloride of Bromine, Chloride of Iodine etc.

CHLOROFORMUM. U. S., Br. Chloroform.

"A liquid consisting of 99 to 99.4 percent., by weight, of absolute chloroform, and 1 to 0.6 percent. of alcohol." < U. S.

"Chloroform or trichlormethane, CHCl_3 , to which has been added sufficient absolute alcohol to produce a liquid having a specific gravity of not less than 1.490 and not more than 1.495." < Br.

Chloroform is a derivative of aldehyde, known chemically as trichlormethane. It was discovered in 1831 at almost the same time by Soubeiran in France, Liebig in Germany, and Guthrie of Sacketts Harbor, New York. Several methods of preparing it are employed

by manufacturing chemists, the most familiar being by the action of chlorinated lime on alcohol. A recent process is now employed commercially, by which wood or sawdust is decomposed at a high temperature, and chloroform prepared from the crude acetates obtained, at a much lower cost of production.

The uses of chloroform as an anæsthetic, narcotic and sedative are well known. It is employed internally as a sedative and narcotic, in doses of from 1 to 10 minims, largely diluted; and externally as a counter-irritant and sedative in liniments and applications for neuralgia, pain etc.

The U. S. P. formerly recognized two preparations of chloroform, namely, Purified Chloroform and Commercial Chloroform; but at present only "Chloroform" is official. Chloroform may be used externally, internally, or by inhalation, and is now sufficiently pure to be quite generally used by physicians and druggists for all purposes required.

As the processes for making chloroform are somewhat complicated, and it is seldom made except by manufacturing chemists, they are not repeated here.

Chloroform should have a specific gravity not below 1.476 at 25°C. (77°F.). It is soluble in about 200 parts of water, and in all proportions in ether and alcohol. It is not inflammable like ether, but is volatile, even at low temperatures, and boils at 60° to 61°C. (140° to 141.8°F.). Preparations containing chloroform will be found under their appropriate headings.

Chloroformates.

Preparations in which chloroform is used as a solvent of the substances the same as alcohol is used for making tinctures, are properly called "chloroformates."

Chloroformum Albuminatum. Albuminated Chloroform. Mix white of egg and chloroform, equal parts, by weight, shaking them together until uniformly mixed.

Chloroformum Benzoatum. Benzoated Chloroform. Benzoic acid 3 parts, chloroform, by weight, 97 parts. Dissolve.

Chloroformum Camphoratum. Camphor Chloroform. Camphor 5 parts, chloroform, by weight, 50 parts. Dissolve.

Chloroformum Glycerinatum. Glycerinated Chloroform. Chloroform 10 parts, soap spirit (Ger.) 70 parts, glycerin 20 parts. Mix the chloroform with the soap spirit and add the glycerin. This is a good liniment for pain and neuralgia.

Chloroformum Phosphoratum. Phosphorated Chloroform. Chloroform 10 parts, phosphorus 1 parts. Warm them together in a closed bottle, only two-thirds filled, and when the phosphorus is melted shake them together until dissolved.

CHLOROPHYL.

The green coloring matter obtained from the leaves of plants. This substance is formed in the exposed parts of plants by a natural process, and may be obtained by dissolving the chlorophyl bodies or grains by some substance that will hold it in solution. Its solution is a bright-green liquid or extract from the leaves and for use in coloring it is variously prepared to color aqueous solutions and spiritous solutions up to 85% of alcohol. These extracts or solutions are used in perfumes, toilet waters and cordials to give the required green color to the compound, and may be obtained from manufacturing chemists, suited to the required uses.

CHOCOLATA. Chocolate and Cocoa. (Cacao).

Chocolate is prepared from the roasted seeds of *Theobroma Cacao*, deprived of their husks and shell. Its manufacture in this country, although confined to only a few establishments, constitutes an important industry.

To prepare chocolate, the seeds, which are somewhat like small acorns, are roasted, then decorticated, or deprived of their covering or husks. The kernel is then ground in a mill and made into a paste with heated metal rollers. It is then run into cakes. Chocolate, as thus prepared, contains considerable fatty matter, known as *Oleum Theobroma*, or "Butter of Cocoa." By mixing it with warm water, most of the oil rises to the top and is removed. The precipitate is collected, dried and variously prepared, and is known on the market as *coca*, or *cacao*.

Chocolate and cocoa are extensively used as nutritive drinks, for which they are more esteemed than coffee or tea. In confectionery vast quantities are used, chocolate confectionery being the universal favorite. In pharmacy chocolate is frequently used in confections, for covering the taste of disagreeable medicines, and sometimes in making simple elixir, to which it gives an agreeable flavor. It is extensively used, made into a syrup for the soda fountain.

A variety of proprietary tablets, containing chocolate as a base, have formerly been put on the market, but as they are liable to become wormy or spoil, they have mostly been withdrawn.

It is quite a common error to suppose that chocolate and cocoa are prepared from the well-known coconut, the fruit of the *Cocos nucifera*, instead of the small acorn-like nuts of *Theobroma Cacao*.

CHROMIUM.

Symbol Cr; Atomic weight 52; Sp. gr. 6.80.

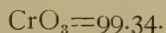
The element chromium is a very hard, brittle, grayish-white metal. It was discovered by Vaquelin in 1797, and is obtained by igniting its oxide with charcoal at an intense heat. It occurs in nature in the form of ore combined with iron (chrome-iron ore), with lead and some other metals. Its melting point is higher than that of platinum. This element is further described in the Chemical Section, Part I.

Some of its salts are extensively used in dyeing, and two of three

of them in pharmacy and medicine. Chromium trioxide and potassium bichromate are the only preparations of chromium used to any extent in medicine.

CHROMII TRIOXIDUM. U. S. Chromium Trioxide.

Acidum Chromicum. Br. Chromic Anhydride.



"It should contain not less than 90 percent. of pure Chromium trioxide (chromic acid anhydride). It should be kept in glass-stoppered bottles, and great caution should be observed to avoid bringing it in contact with organic substances, such as cork, tannic acid, sugar, alcohol, collodion etc., as serious accidents are liable to result." <U. S.

"Chromic anhydride, CrO_3 , commonly termed chromic acid, is produced by the interaction of sulphuric acid and potassium bichromate." <Br.

This is also noticed under the title Acidum Chromicum.

Preparation. Chromium trioxide is the official chromic anhydride, or, as it is more commonly known, chromic acid. It is prepared according to the 1885 Br. P. as follows:

Potassium Bichromate,	30 ounces av.
Sulphuric Acid,	57 fl.ounces
Distilled Water, a sufficiency.	

Dissolve the potassium bichromate in a mixture of 50 fl.ounces of water and 42 fl.ounces of the acid, set aside for 12 hours, and decant the liquid from the crystals of acid sulphate of potassium that have separated. Heat the liquor to about 185°F . (85°C .) and add the remainder of the acid and water sufficient to just redissolve any crystals of chromic acid that may have formed. Allow to cool, collect and drain the crystals, and dry them on porous tiles at a temperature not exceeding 100°F . on an air-bath. From the mother liquor, more crystals may be obtained on evaporation.

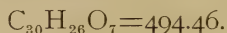
Uses. Chromic acid is a caustic and antiseptic, and is used for removing warts and other morbid growths. It is not given internally.

Other Chromium Compounds.

Some other chromium compounds are known and sometimes used, as chromium bromide, Cr_2Br_6 ; chromium dichloride, CrCl_2 ; chromium fluoride, Cr_2F_6 ; chromium iodide, CrI_6 ; chromium sulphate, $\text{Cr}_2(\text{SO}_4)_3$, but they are usually supplied by chemists when wanted.

Chromium and its compounds are further described in the Chemical Section of this work, Part I, page 269.

CHRYSAROBINUM. U. S. Chrysarobin.



"A neutral principle extracted from goa powder, a substance found deposited in the wood of Vouacapoua Araroba (Aguiar) Druce (Fam.

Leguminosæ). Chrysarobin should be preserved in amber-colored, glass-stoppered vials." <U. S.

This is a pale orange-yellow micro-crystalline powder having sp. gr. 0.920 to 0.922, obtained by treating crude goa powder with alcohol until exhausted, concentrating the extract by heat and evaporating to a crystalline powder. It is soluble in 4812 parts of water, 308 parts of alcohol at 25°C. (77°F.). It is used chiefly in the form of ointment 1:10.

CINCHONA. Cinchona. Peruvian Bark.

Several varieties of Cinchona bark are official in the U. S. and Br. P., and it is official in all pharmacopœias. It is more particularly described in the Materia Medica Section, Part I. Which see.

In the U. S. P. an assay process for cinchona barks is given. The yield should be not less than 5% of total anhydrous cinchona alkaloids and, at least, 4 percent. of anhydrous ether-soluble alkaloids when assayed by the process given. See U. S. P.

Cinchona bark is extensively used in medicine either in the form of powder or some of its fluid preparations or extract; it is also the source of quinine and its various salts and several cinchona alkaloids and their salts used in medicine, the more important of which are hereinafter described.

Average dose of the powdered bark, 1 Gm. (15 grains).

Cinchona Alkaloids.

The natural alkaloids obtained from cinchona bark are

Quinine, Quinidine, Cinchonine, Cinchonidine.

These four are used medicinally and are described under their alphabetical heading. The following are not employed in medicine:

Quinamine, Quinamidine, Cupreine, Homoquinine, Hydroquinine, Hydroquinidine, Hydrocinchonine, Hydrocinchonidine, Cinchonamine, Paytine, Homocinchonine, Homocinchonidine, Cinchottine, Cusconine, Concusconine, Cusconidine, Aricine, Paracine, Paytamine, Dihomocinchonine, Dicinchonine, Chairamine, Conchairamine, Chairamidine, Conchairamidine.

The artificial alkaloids are:

Quinicine, Diquinicine, Cinchonicine, Dicinchonicine, Quinamicine, Protoquinamicine, Apoquinamine, Homocinchonicine.

These alkaloids naturally form an endless combination of salts with acids.

CINCHONIDINÆ SULPHAS. U. S. Cinchonidine Sulphate.



"The neutral sulphate $[SO_2(OH)_2 \cdot (C_{19}H_{22}N_2O)_2 + 3H_2O]$, of an alkaloid obtained from the bark of several species of Cinchona." <U. S. It is soluble in 63 parts of water and 72 parts of alcohol at 25°C. (77°F.).

This salt remains dissolved in the mother liquors after the crystallization of quinine sulphate and is obtained from them by concentrating the liquors and crystallizing. As cinchonidine sulphate is less soluble than cinchonine sulphate, its crystals may be separated before the liquors are treated to obtain cinchonine. The barks from India contain a greater proportion of the alkaloid cinchonidine than those from South America. It resembles quinine sulphate more than any other salt of cinchona, both in its appearance and action, and is much used as a substitute for it, the dose being about a third greater. It is tonic, febrifuge and antiperiodic.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

Cinchonidine. The alkaloid from which the cinchonidine sulphate is derived is not used in medicine or pharmacy. Its chemical composition is the same as cinchonine, but the arrangement of its molecules admits of its combining with one more molecule of water when it forms salts with acids.

Cinchonidine Dihydrobromide may be prepared by dissolving the alkaloid cinchonidine in an excess of hydrobromic acid.

Cinchonidine Salicylate. Prepared by adding to a hot solution of salicylic acid the alkaloid cinchonidine until it is neutralized, then cooling and crystallizing.

CINCHONIDIUM. Chinoidin, Chinoidine. (Quinoidin).

In the manufacture of quinine, after all the crystallizable salts have been obtained from the mother liquors, there remains a black amorphous mass, consisting of the mixed uncrystallizable alkaloids of cinchona bark, mainly **quinicine** and **cinchonine**, which are isomeric with quinine and cinchonine, and have been produced by the action of heat upon them. To this mass is given the name **Chinoidin** or **Quinoidin**.

It has properties similar to other alkaloids from cinchona bark and is considerably used as an antiperiodic, forming the base of most of the "ague pills" that are made. Dose, from 3 to 30 grains.

CINCHONINA. Cinchonine.

In the manufacture of quinine sulphate after it has crystallized from its solution, cinchonine sulphate, which is more soluble, remains dissolved in the mother waters. By adding ammonia or solution of soda to the mother waters, cinchonine is precipitated and may be collected on a filter, washed with water, dried and dissolved in boiling alcohol, from which it is crystallized on cooling. It is but little used in medicine or pharmacy on account of the greater value and solubility of other salts of cinchona.

CINCHONINÆ SULPHAS. U. S. Cinchonine Sulphate.

"The neutral sulphate $[SO_2(OH)_2 \cdot (C_{19}H_{22}N_2O)_2 + 2H_2O]$, of an alkaloid obtained from the bark of several species of *Cinchona*." <U. S.

It is soluble in 58 parts of water and 10 parts of alcohol at 25°C. (77°F.).

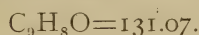
Preparation. This salt is made by dissolving cinchonine in dilute sulphuric acid and crystallizing. It is contained also in the mother liquor after the crystallization of quinine sulphate, and may be obtained as cinchonine after crystallizing chinconidine sulphate and removing it, then concentrating the solution and crystallizing.

Uses Cinchonine sulphate has properties similar to quinine sulphate but may be given in much larger doses. It is more frequently used as a tonic than as an antiperiodic. The usual dose is from 2 to 5 grains, but from 20 to 40 grains are often given as an antiperiodic.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

CINNALDEHYDUM. U. S. Cinnamic Aldehyde.

(Cinnamic Acid).



"An aldehyde obtained from Oil of Cinnamon or prepared synthetically, containing not less than 95 percent. of pure cinnamic aldehyde $[C_6H_5 \cdot CH : CH \cdot COH]$. It is nearly identical with the oil distilled from cassia cinnamon, and should be kept in small, amber-colored, well-stoppered bottles." <U. S.

This is a new official of the U. S. P. It is a colorless liquid, having a cinnamon-like odor and a burning, aromatic taste. Its sp. gr. is about 1.047 at 25°C. (77°F.). It is optically inactive. It boils at about 250°C. (482°F.), with partial decomposition. It should solidify when the temperature is reduced by a mixture of ice and salt, and should melt again at —7.5°C. (18.5°F.). It is sparingly soluble in water, but soluble in all proportions in alcohol, ether and the oils.

An assay process for Cinnamic Aldehyde is given in the U. S. P.

Uses. It is a prompt stimulant and antiseptic, and has been highly recommended in the treatment of tuberculosis and tubercular consumption.

Average dose.—0.05 Cc. (1 minim).

CINNAMYL.

The radical with which acids unite to form compounds is known by this name. A number of combinations of this radical with bases are known to be useful in medicine.

COAL-TAR.

The investigations that have been carried on for the past few years in this substance have developed a large number of chemical com-

pounds that are directly or indirectly employed in medicine. Of the large number of substances obtained by the distillation of coal-tar, but few are used as the bases of medicinal compounds, but from them many combinations are made. The following are the most important:

Aniline (liquid) which is commercially called aniline oil, is the basis of the wonderful aniline dyes and also of several important chemical compounds used in medicine, as acetanilide etc.

Benzene or **Benzol** (liquid) is much used for dissolving resins, rubber, oils, fats etc., and is the source of the "aromatic series" of compounds, many of which are used in medicine.

Toluene or **Toluol** (liquid) which is a member of the benzene family is also the source of many chemical compounds valuable in medicine, among which saccharin may be mentioned.

Naphthalene. This is a white, crystalline substance, which, under the commercial name of coal-tar camphor or moth camphor is extensively used as a germicide and to prevent moths. It is employed in ointments and solutions as a cure for parasitic skin diseases etc. From it are made several valuable medicinal combinations.

Phenol or **Carbolic Acid** is well known and extensively used in medicine and surgery, and is also the source of many valuable medicinal compounds.

Pyridine (liquid). This and its homologues are employed as bases in the synthetic production of several substances resembling the alkaloids of cinchona and other plants.

There are also many other bases and their derivatives found, the more important ones being noted under other titles.

COCA. U. S. Coca.

Cocæ Folia. Br. Coca Leaves.

"The dried leaves of *Erythroxylon Coca*, Lamarck (Fam. *Erythroxylaceæ*), known commercially as Huanuco Coca, or of *E. Truxillense*, Rusby, known commercially as Truxillo Coca, yielding, when assayed by the process given, not less than 0.5 percent. of the ether-soluble alkaloids of coca." <U. S.

The assay process for this drug is given in full in the U. S. P. 8th revision, to which refer.

All Coca preparations are subject to the Pure Food and Drugs Law.

COCAINA. U. S., Br. Cocaine.



"An alkaloid [$\text{C}_8\text{H}_{13}(\text{C}_6\text{H}_5\text{CO})\text{NO}\cdot\text{COOCH}_3$], obtained from several varieties of Coca." <U. S.

"An alkaloid $\text{C}_{17}\text{H}_{21}\text{NO}_4$, obtained from the leaves of *Erythroxylon Coca*, Lam., and its varieties." <Br.

This alkaloid and its salts, which have created such a furore in the medical world, are made from the leaves of *Erythroxylon Coca*. It

may be prepared from its hydrochloride, which is chiefly used, by precipitating an aqueous solution of cocaine hydrochloride with sodium carbonate and washing and drying the precipitate.

Average dose.—0.030 Gm.=30 milligrammes ($\frac{1}{2}$ grain).

Cocaine salts are formed by the combination of this alkaloid with acids. The hydrochlorate (or hydrochloride) which is described in the following article, is extensively used in medicine and surgery and some others are extensively used.

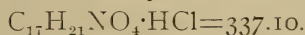
Cocaine Borate. This salt of cocaine has been made and recommended for subcutaneous injection and eye treatment, as being less irritating and a better antiseptic than the hydrochloride.

Cocaine Nitrate. This salt has been prepared to combine with solution of silver nitrate (with which the hydrochloride is incompatible) for the treatment of diseases of the genito-urinary tract.

Cocaine Phenate. This may be prepared by adding cocaine (alkaloid) to carbolic acid, dissolved by heat. It is useful in dental surgery, or for local application for which it should be dissolved in alcohol. Other salts of cocaine have been prepared in a similar manner.

COCAINÆ HYDROCHLORIDUM. U. S., Br.

Cocaine Hydrochloride.



"The neutral hydrochloride [$\text{HCl} \cdot \text{C}_8\text{H}_{13}(\text{C}_6\text{H}_5\text{CO})\text{NO} \cdot \text{COOCH}_3$] of an alkaloid obtained from several varieties of Coca." < U. S.

Preparation. Many processes for making this salt have been proposed since it was introduced; but they all are similar to the process employed for making other alkaloids of the same class. The following is selected as the best for the general convenience of druggists:

Coca Leaves, in coarse powder,	2 pounds av.
Alcohol, a sufficient quantity,	
Diluted Hydrochloric Acid, a sufficient quantity,	
Sodium Carbonate, a sufficient quantity,	
Ether,	4 fl.ounces
Distilled Water,	2 pints
Animal Charcoal,	1 ounce av.

Moisten the powder with a pint of alcohol, pack firmly in the water-bath percolator, cover the drug with alcohol and let stand in a warm place for two days; then heat moderately and begin to percolate, adding alcohol to the drug and continuing the heat and percolation until the drug is exhausted; distil off most of the alcohol, add the water and evaporate until all traces of alcohol have disappeared; add sufficient diluted hydrochloric acid to slightly acidulate the liquor, filter; add sufficient solution of sodium carbonate to precipitate the alkaloid; dissolve the alkaloid from the solution by shaking with ether; separate and evaporate the ethereal solution; dissolve the residue in alcohol, mix with purified animal charcoal, filter; add diluted

hydrochloric acid and water to the filtrate; distil off the alcohol; evaporate and collect the crystals from the liquid and dry them on bibulous paper.

Uses. Cocaine hydrochloride is used in solution as a local anæsthetic in opthalmic and other delicate surgical practice. The solutions employed are generally from 2 to 4 percent. of the salt in distilled water. They are applied by brushing over the parts. It is also considerably employed as an anodyne and intoxicant, in doses of $\frac{1}{5}$ to 1 grain by hypodermic injection.

Average dose.—0.030 Gm.=30 milligrammes ($\frac{1}{2}$ grain).

CODEINA. U. S., Br. Codeine.



“An alkaloid [$\text{C}_{17}\text{H}_{18}(\text{CH}_3)\text{NO}_3 + \text{H}_2\text{O}$] obtained from Opium, or prepared from Morphine by methylation.” <U. S.

“An alkaloid obtained from opium or morphine.” <Br.

An alkaloid obtained from opium, standing next in importance to morphine and now being used extensively by physicians. It is obtained from the ammoniacal liquor left after the crystallization of morphine (see Morphine), by evaporating and crystallizing. As thus obtained it contains impurities which may be removed by dissolving in hot ether and allowing to evaporate spontaneously and crystallize.

Codeine is one of the most soluble alkaloids known, being soluble in 88 parts of water and 1.6 parts of alcohol at 25°C . (77°F .), or in 12.5 parts of ether or 0.66 part of chloroform at the same temperature; and is generally used in preference to any of its salts. It has lately come into notice and favor, and in England, especially, is being much used.

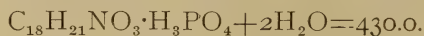
Uses. Codeine is a sedative, analgesic and antispasmodic, but possesses only slight narcotic properties. The dose is $\frac{1}{4}$ to 1 grain.

Average dose.—0.030 Gm.=30 milligrammes ($\frac{1}{2}$ grain).

Codeine Hydrochloride. $\text{C}_{18}\text{H}_{21}\text{NO}_3 \cdot \text{HCl} + 2\text{H}_2\text{O}$. This is official in several European pharmacopœias. It may be made by dissolving codeine in a small quantity of dilute hydrochloric acid, evaporating and crystallizing. The uses and doses are the same as of other codeine salts, except that this is generally chosen for hypodermic injection. Soluble in 20 parts of water.

Codeine Nitrate. This may be prepared by dissolving codeine in a small quantity of dilute nitric acid, concentrating and crystallizing.

CODEINÆ PHOSPHAS. U. S., Br. Codeine Phosphate.



“The phosphate [$\text{PO}(\text{OH})_3(\text{C}_{17}\text{H}_{18}(\text{CH}_3)\text{NO}_3) + 2\text{H}_2\text{O}$] of an alkaloid obtained from Opium or prepared from Morphine by methylation.” <U. S.

"The phosphate of an alkaloid obtained from opium and from morphine." < Br.

It is soluble in 2.25 parts of water, 261 parts of alcohol, 1340 parts of ether, and in 6620 parts of chloroform at 25°C. (77°F.). The most soluble salt of codeine in water, making it specially useful for hypodermic tablets.

It may be readily prepared by adding diluted phosphoric acid drop by drop to a mixture of codeine rubbed up with a little water, until it becomes clear, then concentrating by evaporation and crystallizing.

Its uses are the same as codeine.

Average dose.—0.030 Gm.=30 milligrammes ($\frac{1}{2}$ grain).

CODEINÆ SULPHAS. U. S. Codeine Sulphate.



"The sulphate $[SO_2(OH)_2 \cdot (C_{17}H_{18}(CH_3)NO_3)_2 + 5H_2O]$ of an alkaloid obtained from Opium or prepared from Morphine by methylation." < U. S.

Soluble in about 30 parts of water, and 1035 parts of alcohol at 25°C. (77°F.).

This may be prepared by adding diluted sulphuric acid drop by drop to a mixture of codeine rubbed up with water, until it becomes clear, then concentrating by evaporation and crystallizing. As codeine dissolves in 80 parts of water this salt is more soluble, but it is much less soluble than either the hydrochloride or the phosphate.

Its uses are the same as codeine.

Average dose.—0.030 Gm.=30 milligrammes ($\frac{1}{2}$ grain).

Pure Food and Drugs Law. Codeine and its salts are among the drugs required to be named upon the label of preparations containing them, when intended for inter-state commerce. The label must state the quantity per ounce of the codeine or its salts.

COLCHICINA. U. S. Colchicine.



"An alkaloid obtained from Colchicum. It should be kept in dark amber-colored, well-stoppered vials." < U. S.

This alkaloid of colchicum represents its activity. It is in the form of a pale yellow amorphous powder, having an odor suggesting damp hay, and a very bitter taste.

It is soluble in 22 parts of water and very soluble in alcohol and chloroform at 25°C. (77°F.).

It is prepared in a similar manner as aconitine, from the corm, flowers or seeds of colchicum. It is quite expensive because the yield is only about 0.55 percent. of the drug taken. It is used for the same purposes as colchicum but its concentrated form makes the dose small, from $\frac{1}{128}$ to $\frac{1}{60}$ grain.

Average dose.—0.0005 Gm.=0.5 milligramme ($\frac{1}{128}$ grain) U. S.

COLLODIA — COLLODIONS.

Collodions are liquid preparations made by dissolving pyroxylin or gun-cotton in a mixture of ether and alcohol, and adding other substances if desired. Their value consists chiefly in forming a coating upon the surface to which they are applied, which is utilized in the arts for various purposes, and in medicine for the application of medicinal substances, or the protection of the parts to which they are applied.

The volatile liquids which are contained in collodions rapidly evaporate when exposed to the air or applied to a surface, leaving a thin flexible covering or skin.

The following are the official collodions:

COLLODIUM. U. S., Br. Collodion.

The U. S. P. formula is

Pyroxylin, or Gun Cotton,	40 Gm. or 280 grains
Stronger Ether,	750 Cc. or 12 fl.ounces
Alcohol,	250 Cc. or 4 fl.ounces

"To the pyroxylin, contained in a suitable bottle, add the ether and allow it to stand for fifteen minutes; then add the alcohol, and shake the bottle until the pyroxylin is dissolved. Cork the bottle well, and set it aside until the liquid has become clear. Finally, decant the clear portion from any sediment which may have deposited and transfer it to bottles which should be well corked and sealed." <U. S.

The Br. P. formula is

Pyroxylin,	1 ounce or 10 Gm.
Ether,	36 fl.ounces or 360 Cc.
Alcohol, (90%),	12 fl.ounces or 120 Cc.

"Mix the ether and the alcohol, add the pyroxylin; set aside for a few days; should there be any sediment, decant the clear collodion." <Br. 1898.

The formulas for collodion in all the pharmacopœias are similar to the U. S. and Br., varying only in the proportion of ingredients.

Uses. In the arts collodion has been extensively employed in photography. In pharmacy it is used as a basis for making several preparations, and in surgery it is considerably used as a dressing for wounds, bruises etc., forming a false membrane or skin over the surface. It is an ingredient of most of the popular corn cures, chiefly on account of its convenience of application.

COLLODIUM CANTHARIDATUM. U. S.

Cantharidal Collodion. [Blistering Collodion].

The U. S. P. formula is

Cantharides, No. 60 powder,	60 Gm. or 6 ounces
Flexible Collodion,	85 Gm. or 8½ ounces
Chloroform, sufficient to make	100 Gm. or 10 ounces

The cantharides is exhausted by percolating with hot chloroform, which may be recovered by distillation, until not more than 20 Gm. (or 2 ounces) of residue remains. This is then evaporated to 15 Gm. (or 1½ ounces), which is dissolved in the flexible collodion and set aside to settle.

To produce a blister this is painted with a C. H. pencil over the surface or part required to be blistered.

The Br. Collodium Vesicans is similar to this.

COLLODIUM FLEXILE. U. S., Br. Flexible Collodion.

The U. S. P. formula is

Collodion,	920 Gm. or 1 ounce av.
Canada Turpentine,	50 Gm. or 24 grains
Castor Oil,	30 Gm. or 14 grains

Mix. As the name indicates, this is elastic or flexible.

The Br. P. formula is

Collodion,	12 fl.ounces or 480 Cc.
Canada Turpentine,	¼ ounce or 20 Gm.
Castor Oil,	¼ ounce or 10 Gm.

Mix them.

Most pharmacopœias have a formula for flexible or elastic collodion, and it is called flexible plaster in some authorities. They do not differ much from the above.

COLLODIUM STYPTICUM. U. S.

Stypic Collodion. Styptic Collloid.

Tannic Acid,	20 Gm. or 160 grains
Alcohol,	5 Cc. or 52 minims
Ether,	25 Cc. or 210 minims
Collodion, sufficient to make	100 Cc. or 2 fl.ounces

Put the tannic acid in a bottle, add the alcohol, ether and collodion, enough to make the required measure, and agitate until dissolved.

Uses. As its name indicates, this is used as an astringent and styptic.

COLLODIUM VESICANS. Br. Blistering Collodion.

"Blistering Liquid,	20 fl.ounces or 200 Cc.
Pyroxylin,	½ ounce or 5 Gm.

Add the pyroxylin to the blistering liquid in a stoppered bottle; shake them together until the pyroxylin is dissolved." < Br.

This is very similar to the U. S. Cantharidal Collodion and is used for similar purposes.

The following unofficial collodions are sometimes called for:

Antiseptic, Styptic Collodion.

Tannic Acid,	120 grains
Benzoic Acid,	120 grains
Carbolic Acid,	240 grains
Collodion,	6 fl.ounces
Mix and dissolve. This is commonly called Hæmostatic Collodion.	

Iodinal Collodion.

Iodine,	120 grains
Canada Turpentine,	2 fl.drachms
Collodion,	8 fl.ounces
Or	
Iodine,	15 grains
Flexible Collodion,	1 fl.ounce

The former formula was originally published by J. T. Shinn. It is used as an absorbent application.

Iodoform Collodion.

Iodoform,	30 grains
Balsam of Peru,	30 grains
Green Soap,	30 grains
Flexible Collodion, sufficient to make	480 grains
Mix. An antiseptic dressing for sores, ulcers etc.	

Liebig's Corn Collodion. German Corn Cure.

The following has been extensively published as a formula for corn cure. The chief advantage of the preparation is its convenience of application:

Salicylic Acid,	60 grains
Extract of Cannabis Indica,	10 grains
Collodion,	10 fl.drachms

Rub the salicylic acid and the extract quickly with the collodion to dissolve.

Salicylic Acid Collodion Compound.

This is official in the Ger. S. and Nedl. S. It is used as a corn cure and is similar to Liebig's Corn Collodion.

Ger. S.	
Extract Cannabis Indica,	1 part
Turpentine, (Gum Thus),	5 parts
Salicylic Acid,	10 parts
Collodion,	82 parts
Glacial Acetic Acid,	2 parts
Nedl. S.	
Extract Cannabis Indica,	1 part
Salicylic Acid,	20 parts
Spirit of Ether,	19 parts
Collodion,	60 parts

These are made and used in the same manner as Liebig's Corn Collodion. Many other collodion combinations are prepared, mostly with 5 percent. of the medicament and 95 percent. of collodion.

Acetone Collodion. Filmogen.

Pyroxylin, or Gun Cotton,	5 Gm. or 50 grains
Acetone,	95 Gm. or 950 grains
Dissolve the pyroxylin in the acetone.	

Flexible Acetone Collodion. New Skin.

Pyroxylin, or Gun Cotton,	6 Gm. or 60 grains
Ether,	20 Gm. or 200 grains
Alcohol,	20 Gm. or 200 grains
Acetone,	40 Gm. or 400 grains
Castor Oil,	12 Gm. or 120 grains

Mix the liquids and dissolve the pyroxylin in the mixture. This is similar to a preparation used as an adhesive and dressing and known as "New Skin."

COLORES. COLORS.

In pharmacy a variety of coloring preparations are made for coloring various medicinal and toilet preparations, juices, solutions, syrups, extracts, powders etc. They are very properly divided into several classes, which will be considered in the order of their importance in pharmacy. Many of the substances from which they are made are noticed under other heading, as Anilina, Tinctoria etc.

Pure Food and Drugs Law. All preparations following in this article are harmless colorings and are permitted under the Pure Food and Drugs Law. It is required, however, that preparations intended for inter-state commerce, if artificially colored, shall state upon the label "artificially colored," it being inferred that a harmless coloring is used.

Caramel or Burnt Sugar Coloring.

For coloring light-amber to dark-brown:

Sugar, any convenient quantity.

Water, a sufficient quantity.

Put the sugar (without water) into an iron kettle of several times the capacity required for it, heat it to 410° to 430°F. so long as it gives off much vapor, and until it is changed to a black, viscid mass, stirring it occasionally during the operation, then cool, and while cooling add hot water in the proportion of one pint for each pound of the sugar used, let stand to dissolve, strain the solution and concentrate it by evaporation to a syrupy consistence, or until it measures a pint for each pound of sugar used.

As ordinarily made no precaution is taken to regulate the degree of heat, and for that reason a portion is converted into charcoal, which is insoluble. In small operations this is unimportant, but in manufacturing establishments the heat is regulated by an oil or sand-bath, or other means, to avoid this difficulty.

As this preparation requires some experience to make properly, it is seldom prepared except by manufacturers. They generally use molasses or the refuse of sugar manufacture to prepare it, and it is made of different grades of solubility for different uses. For coloring liquors it is prepared to dissolve in spirits up to 85° proof; but for general use, that which dissolves in water and spirits up to 50° proof is usually furnished.

Preparations containing more than 50 percent. of alcohol precipitate this coloring, and it may be obtained pure in the form of a mass or powder by pouring it into strong alcohol, and afterwards washing the precipitate with alcohol.

Uses. Caramel is used extensively for coloring liquors, bottled beverages, soda-water syrups etc. In pharmacy it is employed for coloring syrups, elixirs, solutions, wines and other liquids, which are required to have an amber or brownish coloring. A reddish-brown is made by mixing caramel with red coloring. It is also used in concentrated form to give a dark-brown coloring to confectionery.

Carmine Red Coloring. Solution of Carmine.

Carmine, No. 40,	120 grains
Potassium Carbonate, (Salts of Tartar),	60 grains
Glycerin,	2 fl.ounces
Ammonia Water,	½ fl.ounce
Water,	5 fl.ounces

Rub the carmine with the salts of tartar to a fine powder, and then with the glycerin, ammonia water and lastly with the water, added in successive portions to rinse out the mortar. This is a strong red coloring, easily made, and will keep permanently.

Uses. This solution may be used for coloring all neutral elixirs, solutions, tinctures, syrups etc., which do not contain a large percentage of alcohol. It is precipitated by acids, and cannot, therefore, be employed for coloring acid syrups etc. It makes a fine **red** or **carmine ink**, and may be perfumed by diluting with an equal quantity of orange flower or rose water, and used as "**liquid rouge**." It may be used for giving a flesh tint to liquid face cosmetics, and may be mixed with face powders to give them the same.

When used for coloring powders it should first be rubbed with a little of the powder and then with the remainder.

Cochineal Red Coloring.

Cochineal,	1 pound av.
Sodium Carbonate, (Sal Soda),	1 ounce av.
Alcohol,	1 pint
Water, sufficient to make	2 pints

Grind the cochineal to a coarse powder, mix the alcohol with one pint of water, and dissolve the sal soda in the mixture, moisten the powder with the liquid, put in a water-bath percolator, pour upon it the remainder of the liquid, allow to stand for 24 hours, heat moderately for 1 hour, then percolate, adding water to the drug after the liquid has disappeared from the surface, and continuing the percolation until $1\frac{3}{4}$ pints of the percolate have passed, which reserve, continue the percolation with water until a pint more has passed, which evaporate to 4 fl.ounces, and add to the reserved portion.

Uses. This may be used the same as the carmine solution for coloring all neutral elixirs, syrups etc. When added to an acid preparation the color is very much weakened, and a precipitate eventually forms. By adding this coloring to some absorbent material a paste color may be prepared.

Cochineal Fruit Red.

Cochineal,	1 pound av.
Cream of Tartar,	2 ounces av.
Alcohol,	1 pint
Water, sufficient to make	2 pints

Make in the same manner as the preceding formula.

Uses. This coloring may be used with fruit juices, syrups, wines, or other mildly acid preparations, and gives with them a bright red color. It may also be used with neutral liquids, but for alkaline liquids use either the carmine solution of the cochineal red.

Cudbear Red.

Cudbear,	1 pound av.
Alcohol,	1 pint
Water, sufficient to make	2 pints

Percolate and proceed in the same manner as is directed for making cochineal red. This is also known as **tinctura persionis**.

Uses. This makes an excellent red coloring, which may be used for all neutral and acid preparations. It is similar to most of the "fruit coloring" that is sold by dealers in soda water supplies. Acids brighten but do not weaken its color; with alkalies it gives a purple color.

Archil or **Orchil** is a thick liquid prepared in England from the same plant as is used for making litmus and cudbear. It makes a fine dark-red coloring with acids and a purplish color with neutral or alkaline preparations. It may also be used in making paste colors by mixing it with some absorbent slightly acid material.

Grass-Green.

Fresh Lawn Grass, any convenient quantity.

Alcohol, a sufficiency.

Cut the grass fine, put it in a wide-mouthed bottle, as compactly as possible, and cover it with alcohol, let stand for a few days with occasional agitation,

and pour off the liquid, which will be of a dark-green color. The chlorophyll of the grass is dissolved by the alcohol.

Uses. This is used for coloring bay rum and some liquors and cordials. As it is only slightly soluble in water, it is not recommended for aqueous preparations, a soluble preparation being made for that purpose.

Chlorophyll is prepared and furnished by manufacturing chemists, both for **alcoholic solutions** and for **aqueous solutions**. The kind required for alcoholic solutions is used for coloring various toilet preparations, and that for aqueous solutions may be used to color any liquids of not more than 50 percent. alcohol. They make very beautiful green colors.

Sap-Green. This is prepared from the juice of buckthorn berries, by allowing it to ferment and then evaporating to dryness, adding while it is still fluid, lime or some other alkali. This is usually put into bladders, and is frequently called "bladder green."

This may be used for making a paste color for confectionery.

Lemon-Yellow.

For coloring extract of lemon and other spiritous solutions a natural lemon-yellow, chop the peel of lemons and cover with alcohol, allow them to stand a few weeks, then pour off the liquid.

Fustic-Yellow.

Ground Fustic Wood,	1 pound
Alcohol,	1 pint
Water, a sufficient quantity to make	2 pints

Pack the fustic in a percolator, pour the alcohol upon it, and after standing 24 hours percolate, setting aside all the liquid that will drop. Then add hot water through the percolator until two pints of percolate are obtained. This aqueous percolate is used for coloring lemon-extract. The alcoholic percolate is of a darker color and should not be used for this purpose.

Litmus Blue.

The method of making a solution of litmus is described in this work under "Test Solutions." This may be used for coloring neutral preparations, but is changed to red if acid is present.

Orange.

For coloring orange flavoring extract made from oil of orange or other spiritous solutions a true orange color, chop the peels of oranges and cover them with alcohol, allow to stand for a few weeks, then pour off the liquid.

Saffron Orange may be made from saffron in the same manner as lemon yellow, and is a fine coloring for many preparations.

Turmeric, with alcoholic solutions makes a light yellow-orange color. It may be used in the form of tincture 1:5, a small quantity for coloring lemon, more for coloring orange extracts, a little red being added for orange.

Annatto or **Arnatto** makes a reddish-orange color in solutions, this is chiefly used in oils or fatty preparations.

Butter Color.

Many proprietary preparations have been extensively sold for coloring butter. The first put on the market were solutions of the coloring principle of annatto or annato in strong alkali. These had the disadvantage of being unpalatable and coloring the buttermilk, making it unfit to use, but are still used for coloring cheese. For coloring butter, oil colors which combine with the butter only and do not color the buttermilk, are now used entirely. The best butter color may be made from **annattoine**, the coloring principle of annatto, as follows:

Annattoine,	4 ounces av.
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Salad Oil, (Purified Cotton Seed Oil), sufficient to make 1 gallon

Rub the annattoine with a portion (say 1 pint) of the salad oil until it is a smooth mixture of uniform consistence. Grind the mixture very fine through a paint mill, or by continued rubbing in a mortar. Add it to the remainder of the oil, and heat by a water-bath, with occasional stirring, for 4 hours or longer; then, when cool, strain or filter through paper.

As thus prepared this is equal to any of the butter colors on the market, provided only the right materials be used in making it. The annattoine must be free from adulteration, and the salad oil free from odor.

Colors for Powders, Etc.

For coloring tooth powders and pastes and face powders, solutions of carmine may be most advantageously used by first rubbing a portion of the powder thoroughly with it to form a stiff mass, and then incorporating this by rubbing with the remainder of the powder. If powdered carmine be used instead of the solution, great care must be taken to have it finely powdered and thoroughly mixed with the other ingredients.

Other colors for powders are seldom required, but if they are, some harmless drug or pigment may be used, as charcoal or ivory black for black, turmeric for yellow, red saunders for a cheap red, etc.

For other coloring see Soda Water, Toilet Preparations, etc., Part III.

CONFECTIONES. CONFECTIONS.

Confections are substances resembling soft solid extracts, prepared by incorporating medicines with sugar or other saccharine matter and aromatics. They were once very popular, but are now little used. Similar preparations, varying somewhat in consistence and manner of making, were formerly known as **Electuaries** and **Conserves**, and as such they are still called for occasionally.

Confections and Conserves.

Of the confections formerly official, but two have been retained in the U. S. Pharmacopœia. The 1898 Br. P. retains four.

Several popular proprietary articles, such as Fruit Laxatives etc., are confections put up in attractive form.

In French pharmacy known as **Conserves**, a great variety of fresh leaves and petals of plants are made into mass by beating or pounding with sugar, until they are thoroughly incorporated. The proportion of sugar used varies from double to three times the quantity, by weight, of the fresh leaves. The following formulæ are representative of the whole class:

Conserve de Cochléaria

Confection of Scurvy Grass.

Scurvy Grass Leaves, fresh,	1 part
Sugar,	3 parts

Beat the substances in a mortar until they are reduced to a pulpy mass, which should then be passed through a hair-cloth sieve by the aid of a flat-ended wooden spatula.

In French pharmacy the leaves or flowers of several plants containing considerable water are made into conserves in the same manner with the same proportion of sugar; as sorrel, fumitory, the cresses, peach and violet flowers etc., are made into confections in this same manner.

Other conserves of leaves which contain considerable moisture are made in the same proportion, but those containing less moisture are made as follows:

Conserve de Laurier-Cerise.

Confection of Cherry-Laurel Leaves.

Cherry-Laurel Leaves, fresh,	1 part
Sugar,	2 parts

Make in the same manner as the preceding.

A great variety of leaves and flowers are made into conserves in this proportion.

U. S. and Br. OFFICIAL CONFECTIONS.

The following are the confections recently and now official in the U. S. and Br. Pharmacopœias:

CONFECTIO OPII. Confection of Opium.

This was official in the 1885 Br. P. as follows:

Compound Powder of Opium,	100 grains or 1 part
Syrup,	300 grains or 3 parts

Mix. Dose, 5 to 20 grains.

As the compound powder of opium contains 10 percent. of opium, this is about the same as the U. S. 1870 preparation, which was made as follows:

Opium, in fine powder,	270 grains
Aromatic Powder,	6 tr.ounces
Clarified Honey,	14 tr.ounces

Mix etc.

This confection was much used during the last century under the names of Theriaca and Mithridate, wonderful virtues being ascribed to it. It is still occasionally called for by those names.

CONFECTIO PIPERIS. Br. Confection of Pepper.

Black Pepper, in fine powder,	2 ounces or 40 Gm.
Caraway Fruit, in fine powder,	3 ounces or 60 Gm.
Clarified Honey,	15 ounces or 300 Gm.

Rub them well together in a mortar. Dose, 60 to 120 grains.

CONFECTIO ROSÆ. Confection of Hips.

This was official in the 1885 Br. P., but has been dismissed.

Hips, deprived of their seed-like fruits,	1 part
Refined Sugar,	2 parts

Beat the hips to a pulp in a stone mortar, and rub the pulp through a sieve, then add the sugar and rub them well together.

To American druggists, who are unacquainted with "hips" it may be explained that it is the oval red fruit of the dog rose or wild brier, common in fields and hedges.

CONFECTIO ROSÆ. U. S. Confection of Rose.**Confectio Rosæ Gallicæ. Br. Confection of Roses.**

The U. S. formula is:

Red Rose (the dried petals)	
in No. 60 powder,	80 Gm. or 2 ounces
Sugar,	640 Gm. or 16 ounces
Clarified Honey,	120 Gm. or 3 ounces
Stronger Rose Water,	160 Cc. or 4 ounces

Rub the rose petals with the stronger rose water, heated to 65°C. (149°F.), then gradually add the sugar and honey, and beat the whole together until thoroughly mixed. (U. S. P.).

The Br. formula is:

Fresh Red-Rose Petals,	1 pound or 500 Gm.
Refined Sugar,	3 pounds or 1500 Gm.

Beat the petals to a pulp in a stone mortar, add the sugar and rub them well together. This is used for making several official pills, and is much prescribed in pill masses etc.

CONFECTIO SCAMMONII. Confection of Scammony.

This was official in the 1885 Br. P., but has been dismissed.

Resin of Scammony, in powder,	6 oz. or 48 parts
Ginger, in powder,	3 oz. or 24 parts
Oil of Caraway,	$\frac{1}{4}$ fl.oz. or 2 fl.parts
Oil of Cloves,	$\frac{1}{8}$ fl.oz. or 1 fl.part
Syrup,	6 fl.oz. or 48 fl.parts
Clarified Honey,	3 oz. or 24 parts

Rub the powders with the syrup and honey into a uniform mass, then add the oils and mix. Dose, 10 to 30 grains.

CONFECTIO SENNÆ. U. S., Br. Confection of Senna.

The U. S. formula is:

Senna, in No. 60 powder,	100 Gm. or 10 ounces
Cassia Fistula, bruised,	160 Gm. or 16 ounces
Tamarind,	100 Gm. or 10 ounces
Prune, sliced,	70 Gm. or 7 ounces
Fig, bruised,	120 Gm. or 12 ounces
Sugar,	555 Gm. or 55½ ounces
Oil of Coriander,	5 Gm. or 3 drachms

Water, a sufficient quantity.

"Digest the cassia fistula, tamarind, fig and prune in a closed vessel with 500 Cc. (or 3 pints) of water for three hours by means of a water-bath. Separate the coarser portion with the hand and rub the pulpy mass first through a coarse hair sieve and then through a fine one, or through a muslin cloth. Mix the residue with 150 Cc. (or 15 ounces) of water, and, having digested the mixture for a short

time treat as before, and add the product to the pulpy mass first obtained. Then, by means of a water-bath, dissolve the sugar in the pulpy liquid and evaporate the whole until it weighs 895 grammes (or 89½ ounces). Lastly, add the senna and oil of coriander, and incorporate them thoroughly with the other ingredients while yet warm." < U. S.

The finished product should weigh 1000 grammes (or 100 ounces).
Average dose.—4 Gm. (60 grains).

The Br. formula does not differ materially from this, except that extract of liquorice is added, and coriander fruit used instead of coriander oil.

This is only official in the U. S. and Br. P. A similar preparation in most other pharmacopœias is known as Electuary of Senna.

Confections similar to this are put up in masses of about a drachm, covered with silver leaf, and sold as Fruit Laxatives or Cathartic Lozenges. As proprietary remedies they have a large sale.

CONFECTIO SULPHURIS. Br. Confection of Sulphur.

Sublimed Sulphur,	4	oz. or	100	Gm.
Acid Potassium Tartrate,	1	oz. or	25	Gm.
Tragacanth, in powder,	18	gr. or	1	Gm.
Syrup,	2	fl.oz. or	50	Cc.
Tincture of Orange,	½	fl.oz. or	12½	Cc.
Glycerin,	1¼	fl.oz. or	37½	Cc.

Mix them. Dose, 60 to 120 grains.

Other Confections and Conserves.

The foregoing official confections embrace nearly all for which there is a demand, except those occasionally called for in receipts from old works on medicine and pharmacy.

No class distinction is now made between confections, conserves and electuaries, but they were formerly classified separately, according to their characteristics. **Confections** being of firmer consistence, and usually made of dry ingredients mixed with sugar, and made up in the form of an extract. **Conserves** being of about the same consistence, but prepared from fresh leaves, flowers, fruit or other vegetable matter mixed with sugar to a stiff, pasty mass. **Electuaries** being of much softer consistence, and prepared generally by mixing powdered substances with syrup, honey or other saccharine liquids.

This distinction is now done away with, and all are classed under the head of confections, but are liable to be called for by old names.

CONIINE. Conicine. Citutine.



The liquid alkaloid obtained from Conium. See page 153.

Coniine Hydrobromide. $\text{C}_8\text{H}_{17}\text{N}\cdot\text{HBr}$. This is in white needles or powder, soluble in 2 parts of water and in 3 parts of alcohol, also in chloroform, but in-

soluble in ether. It may be prepared from coniin by adding enough hydrobromic acid to neutralize the alkaloid, then evaporating carefully and crystallizing. It contains 61 percent. of coniin, alkaloid. It is chiefly used as an antispasmodic and antineuralgic in sciatica, tetanus, whooping cough etc.

CORDIALES — CORDIALS.

In pharmacy a few preparations similar to elixirs are prepared and dispensed under the name of cordials. They have probably derived their name from their similarity to the French Ratafias, Cordials or Liqueurs, which are highly flavored, stimulating beverages, weak in spirit and sweetened. In this class only those cordials which are well known to American pharmacy will be included, the others being mentioned under other headings.

Calisaya Cordial.

Calisaya Bark,	4	ounces av.
Wild Cherry Bark,	4	ounces av.
Orange Peel, fresh,	4	ounces av.
Cinnamon Bark,	2	ounces av.
Anise Seed,	$\frac{1}{2}$	ounce av.
Angelica Seed or Root,	1	drachm
Cloves,	1	drachm
Cardamom Seed,	1	drachm
Alcohol,	2	pints
Rose Water,	1	pint
Sugar,	3	pounds
Water, sufficient to make	1	gallon

Chop the orange peel fine and grind the drugs to a coarse powder, pour the alcohol upon them and macerate for 48 hours; then pour off the alcohol, transfer the drugs to a percolator, pour the alcoholic tincture upon them and percolate. When no more percolate will drop, add to the drugs in the percolator, first the rose water and then water, continuing the percolation until 6 pints altogether of percolate is obtained. Filter clear, dissolve the sugar in the filtrate, and add enough water passed through the drugs in the percolator to make a gallon of the cordial. It may be colored red, if desired, with cudbear coloring or other red coloring.

This is considerably used to disguise the taste of quinine and other disagreeable medicines, and also as a pleasant tonic cordial. Dose, half a wineglassful.

Curaçao Cordial.

Aromatic Cordial: Elixir Curaçao.

Bitter Orange Peel, in very coarse powder,	2	ounces av.
Cloves, in fine powder,	80	grains
Cinnamon, in fine powder,	80	grains
Cochineal, in fine powder,	60	grains

Oil of Sweet Orange,	1 fl.drachm
Orange Flower Water, triple,	8 fl.ounces
Holland Gin,	1 pint
Alcohol,	2 pints
Sugar,	3 pounds
Water, sufficient to make	1 gallon

Pour the alcohol upon the drugs; add the oil of orange and macerate for 2 days; then add the gin and 3 pints of water, macerate for a week, filter and add the sugar and enough water to make a gallon of the cordial.

Fresh sweet orange peel, half a pound, may be used instead of the bitter orange peel, and improves the preparation.

Curaçao Cordial may also be made from the oils as follows:

Oil of Sweet Orange,	2 fl.drachms
Oil of Cloves,	10 minims
Oil of Cassia,	10 minims
Oil of Neroli,	15 minims
Magnesium Carbonate,	4 drachms
Sugar,	3 pounds
Alcohol,	2½ pints
Water,	4 pints

Dissolve the oils in the alcohol and rub with the magnesium carbonate to a smooth mixture in a mortar, pour into a gallon bottle; add the water, and, after macerating a day or two, filter, dissolve the sugar in the filtrate, and color with cochineal coloring or cudbear coloring.

Curaçao cordial is used as a pleasant vehicle for the administration of medicines, and as an adjuvant. It is also frequently employed as the base of various elixirs.

Gentian Cordial.

Gentian Root,	2 ounces av.
Orange Peel, fresh,	4 ounces av.
Cinnamon Bark,	2 ounces av.
Liquorice Root,	2 ounces av.
Wild Cherry Bark,	2 ounces av.
Cardamom Seed,	4 drachms
Angelica Root, or Seed,	1 drachm
Alcohol,	2 pints
Water,	5 pints
Sugar,	2½ pounds

Chop the orange peel fine and grind the drugs to a coarse powder; macerate for two days with the alcohol and pour off; transfer the drugs to a percolator and percolate with the alcoholic tincture; add the water in the percolator, and when all the percolate is obtained, dissolve in it the sugar, and filter.

This is a pleasant appetizing cordial and tonic. Dose, half a wine-glassful.

Many other so-called cordials are made and their formulas will appear in other departments of this work.

CORTICES — BARKS.

In the U. S. P. the Latin title does not indicate that the substance is a bark, as "Cinnamomum;" in the Br. P. the title is "Cinnamomi Cortex;" in most European authorities the Latin title is employed, as "Cortex Cinnamomi;" but in the Fr., Sp., Mex. and Italian the common title is used either with the word signifying bark preceding or following the name of the bark, as "Écorce de Cannelle," Fr.; or simply the common name of the drug without the word signifying bark in connection, as "Canela," Mex., Sp.; "Canella," It.

In this work the barks official in the United States and Great Britain are described in the text and arranged alphabetically under the Latin title of the plant from which it is obtained.

COTARNINE HYDROCHLORIDE. Stypticin.

This is derived from the alkaloid narcotine obtained from opium, by a process of oxidation. It is a yellow, bitter, crystalline powder, readily soluble in water and alcohol. It is employed as a uterine hemostatic and in dental and nasal hemorrhage. The dose is from $1\frac{1}{2}$ to 4 grains in solution or applied on cotton or gauze.

Cotarnine Phthalate. Styptol. This is a yellow, bitter powder, freely soluble in water and is used like Stypticin, as a hemostatic. The dose is the same.

CREOLIN. Ph. Ger. Liquor Cresoli Saponatus.

This is official in the Ph. Ger. 1900, the formula being:

Crude Cresol,	1 part
Potash Soap, (Ph. Ger.),	1 part

Heat them together until a clear preparation is produced.

This is a germicide, antiseptic and disinfectant in the form of a dark-brown liquid prepared by treating cresol with potash soap. It mixes readily with chloroform, ether and alcohol, but with water forms a milky mixture that does not become clear.

Uses. It is used externally, in solution or mixture, largely diluted or mixed with some inert absorbing substance, as Fuller's earth or powdered asbestos. In the form of powder it is applied as a dusting, or in the form of creolin gauze it may be applied to wounds, sores etc. It is also injected for dysentery, largely diluted; and is used in gonorrhœa as an injection, mixed with oil or in the form of bougies. It is also given internally in the form of emulsion, not more than 2 to 5 drops at a dose. Its solution for washing internal cavities should not be more than one percent. In the form of ointment it may be used for all foul ulcers and sores and for parasitic skin diseases. It is also extensively used by manufacturers of disinfecting and deodorizing liquids, for closets, urinals etc., in connection with an automatic

dropping device. For this purpose it is perfumed and put up under various proprietary names.

Creolin Pearson. This is exploited by a reliable chemical house as "Saponified coal-tar creosote, composed of homologues of carbolic acid, water, hydrocarbons, organic bases, soda, resin, sulphur and chlorine." As this is a largely advertised preparation it is, more likely, uniform than other preparations sold under the name of Creolin. Its general description and uses are the same as the German official preparation.

Crealbin. A compound of creolin and albumin intended for use internally. A brown powder representing 50 percent. of creolin. It is chiefly used as an intestinal disinfectant and astringent. Dose 5 to 15 grains.

CREOSOTUM. U. S., Br. Creosote.

"A mixture of phenols, chiefly guaiacol and cresol, obtained during the distillation of wood-tar, preferably of that obtained from the beech." <U. S.

"A mixture of guaiacol, cresol and other phenols; obtained in the distillation of wood-tar." <Br.

Creosote is an oily liquid of a smoky odor, similar in composition and characteristics to carbolic acid. It is obtained by dry distillation of wood, and from smoke, pyroligneous acid, soot etc. It is frequently called for as Oil of Soot.

Uses. Creosote is used in medicine in minute doses to check internal mucous irritation, and as a cleansing application in ointments for ulcers and sores; but it is best known as a remedy for toothache for which it is quite popular. The dose for internal administration is from $\frac{1}{4}$ to 2 minims, in the form of emulsion, or largely diluted.

From it are obtained a number of substances which have recently been introduced into public favor.

The products of the distillation of wood are very similar in many respects to the products of coal-tar. The "heavy oil" of coal-tar distillation which is called "coal-tar creosote" contains many bodies analogous to the creosote obtained from the distillation of wood-tar; although they differ somewhat in their characteristics.

Wood-tar is a complex mixture of phenols and their derivatives which are chiefly the acid methylic ethers of catechol and its homologues. They consist of the monohydric phenols: Phenol or Carbolic Acid, C_6H_5OH ; Paracresol, $C_6H_5(CH_3)OH$; Xylol or Phorol, $C_6H_4(CH_3)OH$; and the Methylic Ethers of Dihydric Phenols, Guaiacol, $C_6H_4(OCH_3)OH$; Cresol, $C_6H_3(CH_3OCH_3)OH$; Homocresol, $C_6H_2(CH_3)_2OCH_3OH$; Cœrilignol, $C_6H_3(C_3H_7)OCH_3OH$; and the Methylic Ethers of Trihydric Phenols, Dimethyl pyrogallate, $C_6H_3(OCH_3)_2OH$; Dimethyl methyl-pyrogallate, $C_6H_2(CH_3)(OCH_3)_2OH$; Dimethyl propyl-pyrogallate, $(C_6H_2(C_3H_7)(OCH_3)_2)OH$; Methyl propyl-pyrogallate, $C_6H_2(C_3H_7)(OCH_3)OH_2$.

Creosote has recently come into use for the treatment of phthisis and tuberculosis, and from the published reports of its success in these diseases it would seem to be worthy of trial. It acts as a germicide

and may be given mixed with olive oil or in the form of emulsion. It is also used in the form of vapor. It should be begun with small doses and gradually increased as the patient will bear it without irritation; as much as 500 drops daily being reported as given without bad effect.

A number of preparations of creosote are used in medicine, the following are the most commonly known:

Cresalbin. A compound of creosote with albumin, used in place of creosote. It is decomposed in the intestinal tract, liberating the creosote.

Cresoform or Creoform. A combination of creosote and formaldehyde. A yellowish-green powder, insoluble in water. It is designed to replace creosote in tuberculosis and diarrhoea. Given in powder.

Cresal or Tannosal. A combination of creosote and tannin. A brown powder containing 60 percent. of creosote in combination, and readily soluble in water, alcohol or glycerin. It is employed as an intestinal astringent, particularly in tuberculosis of the bowels. Dose 10 to 30 grains.

Creosote Carbonate. Creosotal. A mixture of carbonic acid esters prepared from creosote and containing about 92 percent. of creosote. It is a yellow, oily liquid, having a slightly bitter taste and a faint odor. It is insoluble in water but soluble in alcohol, ether, chloroform and oils. Its uses are the same as creosote. Dose 5 to 30 grains internally; 20 to 60 minims applied by innunction in ointment.

Creosote-Magnesol. This is a powder made by combining creosote with calcined magnesia. It contains 80 percent. of creosote absorbed, and is used as a substitute for liquid creosote internally, as the creosote is gradually liberated and gastric irritation is avoided. It is best administered in form of pills.

Cresol Valerianate, (so-called), is known as **Eosote**. A class of salts called **Eosolates** have been introduced by German chemists.

Several other preparations of creosote have been introduced by manufacturers under trade names.

Creosote Phosphate, (so-called), is known as **Phosote**.

Creosote Phosphite, (so-called), is known as **Phosphotal**.

Creosote Tannate, (so-called), is known as **Taphosote**.

CRESOL. U. S. Cresol. [Cresylic Acid].



"A mixture $[C_6H_4(CH_3)OH]$ of the three isomeric Cresols obtained from coal-tar, freed from phenol, hydrocarbons, and water."
<U. S.

The better kinds of so-called crude carbolic acid which are dissolved to a clear solution by caustic soda contain scarcely any carbolic acid (C_6H_5OH), but are mixtures of cresols, the relative amount of ortho, meta and para-cresol being variable. By reason of the higher price of carbolic acid as compared with crude cresol, it is to the interests of manufacturers to carry the separation as far as possible. This is effected by condensers surrounded by hot carbolic acid, adjusted so that only carbolic acid distils over, while cresol vapor is condensed and falls back into the still. Correctly, therefore, what is now termed crude carbolic acid is crude cresol. It may properly be termed coal-tar creosote.

The cresols consist of three isomers, Orthocresol, melting at $31^\circ C.$, and boiling at $188^\circ C.$; Metacresol, a liquid, boiling at $201^\circ C.$, but not

becoming solid even at very low temperatures; and Paracresol, forming colorless prisms, melting at $36^{\circ}\text{C}.$, and boiling at $198^{\circ}\text{C}.$ The mixture of these cresols which are obtained as above stated, from what is known as Cresylic acid. The insolubility of this acid has, to a large extent, prevented its use, but several preparations have lately been made by which it is utilized. Creolin, lysol, solveol, solutol and several other proprietary preparations are derived from cresylic acid.

Its sp. gr. is 1.032 at $25^{\circ}\text{C}.$ ($77^{\circ}\text{F}.$). It is soluble in 60 parts of water at $25^{\circ}\text{C}.$, and miscible in all proportions with petroleum benzin, benzene, alcohol, ether and glycerin; miscible with alkali hydroxide solutions.

Average dose.—0.05 Cc. (1 minim).

Cresol Iodide. Losophan. $\text{C}_6\text{HI}_3(\text{CCH}_3)\text{OH}$. This is a yellowish powder having a strong smell, insoluble in water, soluble in alcohol, ether, chloroform and oils. It is prepared by the interaction of cresols and iodine and contains 80 percent. of the latter. It is known chemically as iso-butyl-phenol iodide, and is used for the same purposes as aristol and iodoform.

Cresol-Naphthol. This is a combination of cresols and naphthol, a brown, tarry liquid, insoluble in water, but producing an emulsion with it. It is a powerful germicide and antiseptic used for similar purposes as cresol.

Cresol-Salols or Cresol Salicylates. $\text{C}_6\text{H}_4\text{OH}\cdot\text{COC}_6\text{H}_4\text{CH}_3$. The three forms of cresol are heated—taken in their proportionate molecular weights—with sodium salicylate and phosphoric chloride, then the resulting product is purified by repeated crystallization from alcohol. It is used for the same purposes as salol, but is considered safer.

Metacresyl salicylate is the best known of the cresol salicylates. It is marketed as **Cresalol**. Colorless, odorless, nearly tasteless crystals, soluble in alcohol and ether but insoluble in water. It is used as an intestinal antiseptic and antirheumatic like salol. Dose 5 to 15 grains.

Cresolic Acids. The three isomeric cresols when acted upon in various ways produce cresolic acids which crystallize in long, white prismatic needles. They do not readily dissolve in water, but in alcohol, ether and chloroform are readily soluble. The salts of the Paracresolic acid, only, are employed in medicine. Sodium paracresolate is the only salt of this acid that has received much attention. It is a crystalline, white powder, of a bitter taste, soluble in 24 parts of warm water. It is used for similar purposes as sodium salicylate but does not, like that, disturb the digestive organs. The dose recommended is from 5 to 15 grains for an adult, 4 to 5 times a day.

CUPRUM — COPPER.

Symbol Cu; Atomic weight (O=16) 63.57; Sp. gr. 8.94.

Copper is a well known metallic element, extensively employed in the arts and industries of the world, and used by many nations as a

small-money coin. It is found native, and combined in the form of ore, in all parts of the world.

In the arts copper and its alloys are much used. Bronze, brass, german silver, gun metal, bell metal and many other alloys may be made by combining it with various other metals. It is also used as an alloy of gold in gold coins and in making jewelry.

Copper and its compounds are more fully noticed in the Chemical Section, Part I.

Salts of Copper.

In pharmacy the salts of copper are considerably used for various purposes, and in medicine they are somewhat employed in solutions, ointments and plasters for external use, but seldom internally.

CUPRI SULPHAS. U. S., Br. Copper Sulphate.

Cupric Sulphate. Blue Vitrol.



Copper sulphate is the only copper salt now official in the U. S. and Br. Ph., but many other salts are used. They are described under the title Copper in Part I.

"It should contain not less than 99.5 percent. of pure copper sulphate [$\text{SO}_2 \cdot \text{O}_2 \text{Cu} + 5\text{H}_2\text{O}$]." <U. S.

"It may be obtained by the interaction of water, sulphuric acid and copper or copper oxide." <Br.

Preparation. This salt is most commonly known by the name of Blue Vitrol or Blue Stone. It is the most used of any of the copper salts, and may be conveniently made by dissolving scraps of copper in sulphuric acid diluted with water, by the aid of heat, then evaporating the solution and crystallizing.

Uses. This salt is considerably used in batteries for generating electricity, for coloring and dyeing purposes, and in medicine for making various cleansing washes, liquids etc. It is sometimes given as an astringent in doses of $\frac{1}{4}$ to 2 grains, and as a quick emetic in doses of from 5 to 10 grains. It is also extensively used as an ingredient of Bordeaux Mixture used for spraying plants.

Average dose.—Astringent, 0.010 Gm.=10 milligrammes ($\frac{1}{5}$ grain). Emetic, 0.250 Gm.=250 milligrammes (4 grains).

Dried or anhydrous copper sulphate is made by heating copper sulphate until its water of crystallization is vaporized, then reducing it to a powder. It is used as a test for alcohol and as an escharotic.

Copper forms combinations with organic substances, some of which are used in medicine. The following are found in the market:

Cupratin. A copper-albumin compound containing 6.4 percent. of copper, prepared by precipitating a solution of copper sulphate with albumen. It is recommended as a non-toxic alterative and nervine. It is a brown mass, insoluble in water. Dose $\frac{1}{2}$ to 1 grain.

Cuprohemol. Cuprated hemol. This is hemol with 2 percent. of copper organically combined. It is a dark-brown, insoluble powder, used in tuberculosis, scrofula etc. Dose $1\frac{1}{2}$ to 3 grains.

Cuprol. Copper nucleinate. A compound of copper with nucleic acid, containing 6 percent. of copper. It is a green powder, soluble in water, its solutions do not coagulate albumin and are not precipitated by alkalies. It is used as an astringent and antiseptic application as a 10 percent. solution in eye diseases etc.

CYANOGEN.

CN or Cy

Cyanogen is a gaseous radical discovered by M. Gay-Lussac, in 1815. It is most readily obtained by igniting dry mercury cyanide in a small retort, and collecting the gas over mercury. It is colorless, and its odor resembles that of freshly-bruised peach kernels. It is important in chemistry and pharmacy as forming a class of acids with hydrogen and oxygen, which form salts with metals and alkaline bases called **cyanides** or **cyanurets**. Its acids are as follows:

Cyanic Acid. HCNO. Made by distilling cyanuric acid deprived of its water of crystallization in a retort, and collecting the vapor in a well-cooled receiver. **Cyanates** are salts in which the hydrogen of cyanic acid is replaced by some metallic base or other basic radical.

Hydrocyanic Acid. HCN. Prussic Acid. This is obtained by heating potassium ferrocyanide $2\frac{1}{4}$ ounces, with sulphuric acid 1 fl.ounce, and 10 fl.ounces of water in a flask, and distilling, collecting the gaseous product in water, or water mixed with alcohol, until any desired percentage is obtained. The official **Diluted Hydrocyanic Acid** contains 2 percent. of real acid. See Acidum Hydrocyanicum.

DECOCTA — DECOCTIONS.

Decoctions, which were formerly favorite forms of preparing medicines, have gradually given place to more scientific preparations, and are now seldom used.

The process of decoction is to boil the vegetable substances for from 10 to 15 minutes in water in a covered vessel, and then cool and pour off the liquid. It is obvious that the water-bath percolator is the most convenient apparatus to use for this purpose, as there is no danger of burning the drugs or excessively heating the mixture, and when the boiling is completed the liquid may be drawn off by the stop-cock. The following general directions for making decoctions are therefore given:

Decoction by Water-Bath Percolation.

The substance, coarsely comminuted,	1 ounce av.
Water, enough to make	20 fl.ounces

Having adjusted the perforated diaphragm or strainer in the bottom of a small-sized water-bath percolator, put the substance in the percolator and pour the water upon it. Cover the percolator closely with the cover, and having filled the vessel surrounding the percolator with

water, heat the boiler. Boil for 15 minutes and draw off the liquid by means of the stop-cock, adding enough water through the percolator to make 20 fl.ounces of the product when cool.

The quantities as above directed are the same as the general formula from the U. S.

In the present U. S. P. only the general formula for decoctions is given.

The present U. S. official directions for making decoctions are to take of

The substance, coarsely comminuted, 50 Gm. or 364 grains

Water sufficient to make 1000 Cc. or 1 pint

Put the substance in a suitable vessel provided with a cover, pour upon it 1000 Cc. (or a pint) of cold water, cover and boil for 15 minutes, then strain and add water enough to make the product 1000 Cc. (or a pint).

The two formulas following were official in the 7th revision of the U. S. P. and are given here, as they may be called for:

DECOCTUM CETRARIÆ. Decoction of Cetraria.

Cetraria, (Iceland Moss), 50 Gm. or 364 grains

Water enough to make 1000 Cc. or 1 pint

Cover the cetraria with cold water for half an hour, express and throw away the liquid; then boil the drug with 1000 Cc. (or a pint) of water for half an hour, strain, and add enough cold water through the strainer to make 1000 Cc. (or 1 pint) of the finished product.

DECOCTUM SARSAPARILLÆ COMPOSITUM.

Compound Decoction of Sarsaparilla.

Sarsaparilla, crushed, 100 Gm. or 729 grains

Sassafras, in coarse powder, 20 Gm. or 146 grains

Glycyrrhiza, 20 Gm. or 146 grains

Guaiacum Wood, rasped, 20 Gm. or 146 grains

Mezereum, crushed, 10 Gm. or 73 grains

Water, enough to make 1000 Cc. or 1 pint

Boil the sarsaparilla and guaiacum wood for half an hour in a suitable vessel with 1000 Cc. (or 16 fl.ounces) of water. Then add the sassafras, glycyrrhiza and mezereum, cover the vessel well and macerate for two hours. Finally strain and add enough cold water through the strainer to make the product measure 1000 Cc. (or 16 fl.ounces).

Decoctions of the Br. P.

Three decoctions remain official in the present (1898) Br. P. They are:

DECOCTUM ALOES COMPOSITUM. Br.**Compound Decoction of Aloes.**

Extract Barbados Aloes,	½ ounce	av. or	10 Gm.
Myrrh,	¼ ounce	av. or	5 Gm.
Saffron,	¼ ounce	av. or	5 Gm.
Potassium Carbonate,	¼ ounce	av. or	5 Gm.
Extract of Liquorice,	2 ounces	av. or	40 Gm.
Comp. Tincture Cardamoms,	15 fl.ounces	or	300 Cc.
Distilled Water, to make	50 fl.ounces	or	1000 Cc.

"Reduce the extract of Barbados aloes and the myrrh to coarse powder, and boil them and the potassium carbonate and the extract of liquorice in 20 fl.ounces (or 400 Cc.) of distilled water, in a covered vessel for 5 minutes; add the saffron; when the liquid is cool add the tincture of cardamoms; set aside for two hours; strain through flannel; pass sufficient distilled water through the strainer to make 50 fl.ounces (or 1000 Cc.) of the compound decoction of aloes." < Br.

DECOCTUM GRANATI CORTICIS. Br.**Decoction of Pomegranate Bark.**

Pomegranate Bark, No. 10 powder, 4 ounces av. or 200 Gm.

Distilled Water, a sufficient quantity.

"Boil the pomegranate bark with 24 fl.ounces (or 1200 Cc.) of distilled water in a suitable vessel for 10 minutes; strain; pour enough distilled water over the contents of the strainer to make 20 fl.ounces (or 1000 Cc.) of the strained decoction." < Br.

Dose, ½ to 2 fl.ounces.

DECOCTUM HÆMATOXYLI. Br. Decoction of Logwood.

Logwood, in chips, 1 ounce av. or 50 Gm.

Cinnamon Bark, bruised, 70 grains or 8 Gm.

Distilled Water, a sufficient quantity.

"Boil the logwood with 24 fl.ounces (or 1200 Cc.) of distilled water, in a suitable vessel for ten minutes, adding the cinnamon bark towards the end of the time; strain; pour enough distilled water over the contents of the strainer to make 20 fl.ounces (or 1000 Cc.) of the strained decoction." < Br.

Dose, ½ to 2 fl.ounces.

Other Decoctions.

Of the seventy-five decoctions, or preparations which may be classed as decoctions in the pharmacopœias of the world, a large number are more properly infusions and are included in the Tisanes of Fr. pharmacy and the infusions of Spanish pharmacy, and under Decoctions, Infusions, or other headings in other pharmacopœias. There is no marked difference between decoctions and infusions except that, as

understood in the U. S. and Br. P., decoctions are boiled for from 5 minutes to half-an-hour, and infusions are made by pouring boiling water upon the drug and letting it macerate until cool. In either case the heated menstruum extracts the soluble constituents of the drug, or, as in *Decoctum Cetraria* etc., converts the drug to a gelatinous mass. For other preparations under the title "Decoctions" which may not be found in this article, see Infusions.

DESTILLATÆ — DISTILLATES.

All preparations obtained by the process of distillation are distillates, in the same sense that all preparations made by percolation are percolates, but as distillation is a process rather than a characteristic of the substances employed, the distillates are classed under the various headings where they properly belong.

The process of distillation in pharmacy is of great importance. The preparations in which the process is employed will be found in nearly all classes of fluid galenicals.

DEXTRINUM. Dextrin. Artificial Gum. British Gum.



When starch is subjected to the action of dilute acids at a boiling temperature, it is converted into a substance resembling gum, which is called **dextrin**. The same also occurs when potato starch is heated to about 360°F. for an hour or two in an oven, and in this manner it is usually prepared commercially. In making an infusion of malt the diastase acts upon the starch, first converting it into dextrin, and then into sugar.

Dextrin is much used in the arts for various purposes, as a substitute for gum. It is extensively used for making paste and mucilage, and as a dusting for pills, and upon irritated surfaces.

A **yellow** and a **white** variety of dextrin are found in the market. The former is heated to a higher degree in preparing it, and is more commonly used as an adhesive by bookbinders, label manufacturers etc.; while the white variety is the basis of library paste and similar adhesives put up to take the place of paste and mucilage, for office use, and is largely used in paste compounds for labelling machines.

Dextrin Syrup or **Starch Syrup** is a syrup of high conversion, containing 40 to 45 percent. of grape sugar, and about the same of dextrin. It is considerably used as a table syrup under various fancy names, and is frequently directed in medicinal compounds.

Dextrin Mucilage. A good mucilage may be made by dissolving 1 part of dextrin in 2 parts of hot water. The proportions may be varied, making a mucilage thick or thin, as may be desired.

DIALYSATÆ — DIALYSATES.

A number of preparations made by the process of dialysis have recently been introduced into pharmacy and are somewhat used, the best known being dialysed iron. A few pharmaceutical preparations are made by the process. As dialysis is a process rather than a characteristic of the preparation, the dialysates might, perhaps, be more properly classed elsewhere, but as they are so few, they are given under this heading.

FERRUM DIALYSATUM. Dialysed Iron.

A solution of dialysed iron or liquor ferri dialysatus may be prepared as follows: It was formerly official in the Br. P.

Strong Solution of Perchloride of Iron,

(Br. P., sp. gr. 1.42),

14 fl.ounces

Ammonia Water,

Water, of each, a sufficient quantity.

Mix 12 fl.ounces of the iron solution with 1 gallon of water in an earthenware jar that will hold 3 gallons, and add, with constant stirring ammonia water until the iron is all precipitated and the liquid remains alkaline. Let the precipitate settle and wash it with water until the washings give no precipitate with nitrate of silver, then transfer the precipitate (ferric hydrate) to a calico strainer; drain and express the water. While still moist, mix the precipitate in a jar with 2 fl.ounces of the iron solution, same as previously used; warm and stir them occasionally for a day or two until all has dissolved that will; then dialyse the solution as directed, changing the water every day or two, for ten or twelve days, or until the preparation is free from styptic taste, and clear, and make the dialysed solution measure 56 fl.ounces.

This should contain 5 percent. of the iron oxide.

Uses. Dialysed iron in solution has been a quite popular form of administering iron as a tonic. It is given in doses of 10 to 30 minims.

Dialysed Iron in Scales may be made by evaporating the solution of dialysed iron to a syrupy consistence and spreading upon glass. When dry it may be removed in the form of scales. The dose is from 1 to 5 grains.

DIALYSATE OF ACONITE.

Aconite Leaves, in very coarse powder,

16 ounces

Water, a sufficient quantity.

Exhaust the drug by percolating in the water-bath percolator with hot water and dialyse the percolate, saving the several waters with which the dialysis is conducted, and evaporating by means of a water-bath to half a pint. To this add half a pint of alcohol and filter.

It will be noted that in this case it is not the contents of the dialyser that is saved, but the liquor which passes through the dialyser, and contains all but the colloid matter of the percolate.

The dialysate has the same strength of the valuable medicinal principles of the drug as the fluid extract.

Dialysate of Belladonna, and of many other drugs may be made in the same general way.

The process of dialysis is sometimes used to separate alkaloids or other principles of plants from colloid principles.

Dialysed Soap is prepared for certain uses, where a soap free from excess of alkali or acids is required.

DIASTASE.

The peculiar ferment in malted grains which converts the starch first into dextrin and then into grape sugar, or dextrose, is called **diastase**. It was discovered by Payne and Persoz in barley, oats, wheat and potatoes in which it is developed during germination. It acts as a very powerful ferment; one part being sufficient to convert 2000 parts of starch into grape sugar. The chief value of extract of malt consists in the excess of diastase that it contains after converting the starch and dextrin of the malt into sugar. If this is destroyed, therefore, by excessive heat or other means in making extract of malt, the value of the extract is very much impaired.

Diastase may be obtained in an impure condition by making an infusion of malt—not heating over 160°F.—pressing, filtering the liquid, and adding the filtrate to alcohol, which precipitates the diastase in the form of a white powder, freely soluble in water. It is an expensive chemical, seldom used, and rarely made, except by manufacturing chemists. Its physiological effect is similar to ptyalin, found in the saliva of animals and man, secreted by the salivary glands, its function being to dissolve starchy matter.

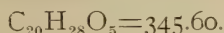
ELATERIUM. Br. *Elaterium*.

“A sediment from the juice of the fruit of *Ecballium Elaterium*.”
<Br.

This is obtained from the very nearly ripe fruit of the squirting cucumber, by cutting it lengthwise and lightly pressing out the juice, then straining through a hair-cloth sieve and setting aside to deposit. The supernatant liquid is then poured off, the sediment poured on a linen filter, collected and dried by gentle heat on porous tiles. It requires about 40 pounds of the fruit to yield half an ounce of elaterium; it is therefore expensive and liable to adulteration.

Uses. *Elaterium* is used as a purgative or hydrogogue cathartic, especially in dropsical conditions. It is generally given in the form of pills or powders, but its solution in alcohol is more effective.

Dose, from one-tenth to one-sixth grain, repeated if necessary.

ELATERINUM. U. S., Br. Elaterin.

"A neutral principle obtained from Elaterium, a substance deposited by the juice of the fruit of *Ecballium Elaterium* (Linné) A. Richard (Fam. Cucurbitaceæ)." < U. S.

Preparation. This is prepared by treating elaterium with successive portions of hot alcohol, evaporating the mixed alcoholic solution to the consistence of a thin oil, and pouring this while warm into a weak, boiling solution of potassium hydroxide. The elaterin crystallizes, leaving the green resin in solution.

It is insoluble in water, soluble in 262 parts of alcohol, 318 parts of ether, 22 parts of chloroform, at 25°C. (77°F.).

Uses. Like elaterium from which it is prepared, it is a hydrogogue cathartic, but is less drastic in its action because of the removal of the resinous constituents.

Average dose.—0.005 Gm.=5 milligrammes ($\frac{1}{10}$ grain).

ELIXIRIA — ELIXIRS.

The class of preparations known in pharmacy as Elixirs, includes a great variety of medicines widely dissimilar in character. The first elixirs were acid preparations prepared by alchemists and the early pharmacists. They were supposed to possess wonderful virtues. "Elixir Album" and "Elixir Rubrum" were the products of wonderful manipulations, and were said to transmute the baser metals into pure silver and gold, and cure "most diseases in man's body." Later on Paracelsus originated the "Elixir Proprietatis," or "Elixir of Long Life," and still later the early pharmacists gave us "Elixir Paregoricum," "Elixir Salutis," "Elixir Stomachicum," and scores of others from which have descended some of our most popular tinctures and other similar preparations.

American pharmacy has adopted the name "elixir" for a class of flavored, sweetened, weakly alcoholic preparations, in which medicinal substances are exhibited in pleasant, palatable form, and which are designed to mitigate the aversion to medicines so common to invalids and delicate persons. Since elixirs have assumed this form and mission, their popularity has greatly increased, and, from two or three proprietary elixirs that were well known forty years ago, the number has grown to hundreds, and they have come to take the place, to an extent, of tinctures and other preparations that were formerly popular forms of medicine. The number of elixirs has increased so rapidly and their combinations are so varied, that it is almost impossible for the druggist to keep a variety of them sufficient to meet the demands of his business. The formulæ for elixirs which follow are therefore arranged so that by keeping a few of the leading bases on hand, their combinations can be readily made by adding various solutions etc.,

and thus save the trouble and expense of keeping so large a variety of elixirs on hand as would be required to supply the demands of the business.

Elixir Flavoring.

Oil of Sweet Orange, fresh,	4 fl.ounces
Oil of Caraway Seed,	2 fl.drachms
Oil of Cassia,	2 fl.drachms
Oil of Anise,	1 fl.drachm
Alcohol,	15 fl.ounces

Mix. This is a strong flavoring, of which one ounce is sufficient for a gallon of elixir. Many elixir flavoring formulas have been proposed and published, but no other has been found equal in all respects to the foregoing, provided, only, that good materials are used in making it. Oil of orange, as is well known, deteriorates by age and exposure, becoming terebinthine in odor, therefore it is necessary that only sweet, fresh oil of orange shall be used, for upon that depends the flavor of the elixir. Oil of caraway seed, not caraway chaff, should be used. Deodorized alcohol or cologne spirit should be employed in making the flavoring as well as in making all the elixirs.

When dissolved in the alcohol the flavoring will keep for any length of time; it is therefore best to get the oils as fresh as possible, and make them up while fresh, in the flavoring.

Many formulas have been published for making elixir flavoring from the substances instead of the oils; as fresh orange peel, caraway seed, cassia bark etc.; but their flavor when thus prepared is uncertain, and besides the substances themselves contain astringent principles, which make inky mixtures when combined with salts of iron in solution, and are otherwise objectionable for the purpose. It is therefore advised that only the flavoring made from oils be used, and, from long experience the formula given be chosen in preference to any other.

The New York and Brooklyn Formulary publishes a formula quite similar under the title

Spiritus Aurantii Compositus. Compound Spirit of Orange.

Oil of Bitter Orange,	4 fl.ounces
Oil of Lemon,	1 fl.ounce
Oil of Coriander,	160 minims
Oil of Star Anise,	40 minims
Deodorized Alcohol, enough to make	20 fl.ounces

Mix them. This may be used, if preferred, in the same proportion and manner as is directed in these formulæ for elixir flavoring.

One objection to this is that it is much more difficult to obtain a fresh, fine oil of bitter orange than of sweet orange, although when fresh it is to be preferred to it.

Soluble Flavoring.

For Elixirs Etc.

The elixir flavoring will not mix with the elixir base without making a cloudy or milky mixture, and elixir made with it has to be filtered through magnesium carbonate or some other alkaline or absorbent material to make a clear solution.

It is frequently desirable to have an elixir flavoring that will make a clear solution when added to an elixir base, percolate or syrup, and the following is designed for that purpose.

Elixir Flavoring,	16 fl.ounces
Magnesium Carbonate,	4 ounces av.
Alcohol,	3½ pints
Hot Water,	4 pints

Mix the flavoring with the alcohol. Rub the magnesium carbonate in a mortar or through a wire sieve to a powder, and mix with the water; then gradually add the mixture of magnesium and water to the solution of flavoring, and after standing a day or two (or longer), with occasional agitation, pour off the clear liquid, pour the precipitate upon a filter paper, and filter the poured off liquid through the precipitate until perfectly clear.

One ounce of the soluble flavoring added to a pint of any elixir or syrup base gives the desired flavoring.

This may be added to elixirs requiring percolation, after the percolation is completed, and to syrups, solutions etc. It may be added to any elixir in which a stronger flavor may be desired, and is useful for flavoring many medicinal preparations.

Elixir Percolating Menstruum.

Alcohol,	38 fl.ounces
Water,	72 fl.ounces

Mix them. The proportion of alcohol and water used is the same as in the elixir, and after the other ingredients, as sugar and soluble flavoring are added, it is the same as the elixir.

This elixir percolating menstruum is used as a menstruum whenever it is necessary to obtain the strength of drugs by percolation in making elixirs. The sense of this will be apparent when it is considered that the sugar contained in the elixir would be a hinderance to percolation, and that the flavoring ingredients used would lose much of their strength during the process and exposure of percolation. In making an elixir requiring percolation, therefore, the drugs are first percolated with the percolating menstruum, the percolate filtered if necessary, and then the sugar dissolved in the filtrate, and the soluble flavoring added, which completes the elixir.

Elixirs Requiring Percolation.

When it is required to make an elixir in which the strength of the drugs is obtained by percolation, the process of water-bath percolation is recommended, but ordinary percolation may be employed instead, if more expedient. The following is the process:

The drug or drugs as stated in the formula.

Elixir Percolating Menstruum, sufficient.

Moisten the drugs with elixir percolating menstruum, and after standing a few hours in a covered vessel, transfer them to a water-bath percolator, pack moderately, pour enough of the percolating menstruum upon them to cover them well, and set in a warm place for 24 hours; then heat moderately, and after one hour begin to percolate; add the percolating menstruum to the drugs in the percolator, and continue the percolation until 13 fl.ounces of percolate is obtained for each pint (16 fl.ounces) of the finished elixir required. This is then to be filtered if necessary, and to complete the elixir, take for each pint

The Percolate, as above,	13 fl.ounces
Sugar,	5 ounces av.
Soluble Flavoring,	1 fl.ounce

Mix them and dissolve the sugar by agitation. Should it be required to remove the tannin, or otherwise treat or manipulate the percolate for any purpose, it should be done before the sugar and flavoring are added.

If small quantities only of elixirs are required to be made, when the quantity of drugs used would be quite small, they may best be made by macerating the drugs with elixir, instead of by percolation, or, perhaps better yet, by using fluid extracts of the drugs instead of the drugs themselves. The following is the method of procedure when fluid extracts are used:

Elixirs made with Fluid Extracts.

If it is desired to use fluid extracts of the drugs, instead of the drugs themselves, as directed in the formula, take of

Fluid extracts of the drugs, the same fluid measure as is directed of weight.

Elixir sufficient to make the required measure as stated in the formula.

Mix and filter. Magnesium carbonate or precipitated calcium phosphate or purified talc are sometimes added to make them filter clear.

The elixir in this case is used instead of the elixir percolating menstruum, soluble flavoring and sugar. When fluid extracts, which precipitate badly when added to the elixir are used, it is better to mix them with the percolating menstruum and filter, then add the flavoring and sugar, the same as directed in the formula.

Elixirs with Salts in Solution.

Some of the more soluble salts dissolve readily in the elixirs, and others require to be dissolved separately before adding to them. Among the solutions will be found formulæ for making solutions convenient for combining with elixirs etc. They are referred to in the formulæ in which they can be advantageously used.

Detannating Elixirs.

It is necessary in making some elixirs and other preparations from substances containing tannin or astringent principles, to remove these principles in order that the preparations may be combined with salts of iron or other substances which would otherwise be precipitated. This may be accomplished by adding to the elixirs any substance which will combine with the astringent principles and form precipitates which may be removed by filtration. Albumen, gelatine, and freshly precipitated ferric hydrate are the best adapted for that purpose, as they readily form precipitates with vegetable astringents. We have generally chosen albumen (white of egg) as being most convenient for the purposes, and have so directed in most of the formulas; but it is sometimes more expedient to use ferric hydrate, especially in preparations containing a large amount of astringent. To detannate with this it is necessary to use freshly prepared ferric hydrate as it is directed (see *Ferri Oxidum Hydroxidum*), and mix more or less of it as may be required with the elixir or other preparation to be detannated, and after standing a day or two, with occasional agitation, filtering through calico. The filtered liquid is then to be tested with tincture of iron, and if tannin still remains in the solution (as is shown by an inky color when it is added), more of the ferric hydrate must be added and the elixir treated as before. The process is tedious, but thorough, and is preferred by some to any other, but in our experience albumen is sufficient for most purposes and is much to be preferred in the way of convenience.

Elixir. Simple Elixir.

The simple base which is used for making elixirs, the same as water is used for dissolving salts, or diluted alcohol for making tinctures, is variously called Elixir, Simple Elixir, Aromatic Elixir, Cordial Elixir, Curaçoa Elixir, Elixir Adjuvans etc. This base will be designated in the formulæ which follow simply as "elixir."

In making elixir only the best material should be used, the elixir flavoring must be good, deodorized alcohol or cologne spirit should be used; granulated sugar is the best and most convenient as it may be readily poured into a bottle. The following is the formula:

Elixir Flavoring,	1	fl.ounce
Deodorized Alcohol (Cologne Spirit),	38	fl.ounces
Water,	72	fl.ounces
Magnesium Carbonate,	$\frac{1}{2}$	ounce av.

Mix two ounces of the alcohol with the elixir flavoring. Rub the magnesium carbonate through a wire sieve to reduce it to a powder, then transfer it to a mortar that will hold at least two pints, add the mixture of flavoring and alcohol, and rub them well together. Mix the remaining 36 ounces of alcohol with the water, triturate 2 pints of the mixture, gradually, with the contents of the mortar, and pour it into a gallon bottle; then rinse the mortar with the remainder of the mixture of alcohol and water and add it to the mixture in the gallon bottle. Allow this to stand for a few hours or longer, agitating it frequently, then filter through paper and dissolve the sugar in the filtrate by agitation. When completely dissolved filter again through paper, if necessary, to make bright and clear.

If desired to increase the strength of flavor of the elixir, a larger quantity of the elixir flavoring and a corresponding quantity of magnesium carbonate may be used.

In making larger quantities of the elixir, as, say 5 gallons or more, it is more conveniently made by adding the elixir flavoring first to the entire quantity of alcohol used; then, having mixed the powdered magnesium carbonate with the entire quantity of water, gradually add the latter to the former with agitation, and let them remain for several days, with frequent agitation before filtering; the liquid may then be filtered off, and the sugar dissolved in the filtrate. In this way any quantity of the elixir may be made with but little trouble.

The elixir as thus prepared is used as a solvent for various salts, and a vehicle for various solutions and other forms of medicine. It may also be used to percolate, but when percolation is required it is best accomplished with the percolating menstruum as directed under elixirs requiring percolation.

Many elixir formulas have been proposed and published, but in an extensive experience in making elixirs, the writer has found no other simple elixir—in all respects and generally for all purposes—equal to the foregoing.

Elixir Acetanilide. Elixir Antifebrin.

Acetanilide,	640	grains
Alcohol,	5	fl.ounces
Glycerin,	5	fl.ounces
Water,	4	fl.ounces
Prepared Flavoring,	1	fl.ounce

Rub the acetanilide to a fine powder, put it in a pint wide-mouth bottle and add the alcohol, heat it by water-bath until dissolved, then

add the glycerin and water, previously mixed and heated, and when cool, add the prepared flavoring. A fl.drachm contains 5 grains of acetanilide. The dose is from 1 to 1½ teaspoonful.

Elixir Acetanilide and Caffeine.

Acetanilide Elixir, as above,	16 fl.ounces
Caffeine,	128 grains

Rub the caffeine in a mortar with the acetanilide elixir until dissolved and filter if necessary. A fl.drachm contains 5 grains acetanilide and 1 grain caffeine. This is a valuable elixir for headache, neuralgia, nervous irritability etc. Dose, 1 to 1½ fl.drachm.

Elixir Acetanilide Compound.

Several differing preparations by this name are found in the market, the two most in demand are

Acetanilide,	160 grains
Salol,	64 grains
Phenacetine,	128 grains
Citrated Caffeine,	64 grains
Tartaric Acid,	32 grains
Sodium Bicarbonate,	196 grains
Elixir, sufficient to make	1 pint
Mix, dissolve and filter.	
Acetanilide,	256 grains
Caffeine,	32 grains
Sodium Bromide,	640 grains
Codeine Sulphate,	8 grains
Tincture Gelsemium,	384 minims
Elixir, sufficient to make	1 pint
Mix, dissolve and filter.	
Dose 1 to 2 fl.drachms.	

Elixir Aconite.

Tincture Aconite Root,	256 minims
Elixir, sufficient to make	1 pint

Mix them. A fl.drachm contains two minims of the tincture. The dose is from ½ to a teaspoonful. This is a very safe and convenient preparation, as the dose of aconite can be regulated as desired.

Elixir Adjuvans.

Many elixirs are known under this name. Simple elixir is usually dispensed when elixir adjuvans is prescribed, unless some other preparation is known to be intended. In some localities an adjuvant elixir is much employed as a vehicle for quinine, for this purpose the following is considerably used:

Orange Peel, fresh, cut fine,	8 ounces av.
Coriander Seed,	2 ounces av.
Caraway Seed, crushed,	1 ounce av.
Cardamom Seed, crushed,	2 ounces av.
Wild Cherry Bark, crushed,	8 ounces av.
Liquorice Root, crushed,	8 ounces av.
Sugar,	32 ounces av.
Alcohol,	2 pints
Water, sufficient to make	1 gallon

Mix the drugs and pour the alcohol upon them, allow to stand for 24 hours or longer, then transfer to a percolator, add two pints of water to the drugs and percolate, adding water through the percolator until 7 pints of tincture are obtained; filter and dissolve the sugar in the filtrate. This may be made more rapidly by water-bath percolation.

A similar preparation is put up by some manufacturers under the names Elixir Liquorice Compound, Elixir Wild Cherry Compound, Quinine Elixir etc.

It is chiefly used as an addition to other preparations, or as a vehicle for bitter medicines. Owing to the tannin contained in the wild cherry, it renders quinine insoluble, thus masking its bitter taste.

ELIXIR ADJUVANS. U. S. Adjuvant Elixir.

This is official in the U. S. P. as follows:

Fluidextract of Glycyrrhiza,	120 Cc. or 3 fl.ounces
Aromatic Elixir, (U. S. P.)	880 Cc. or 22 fl.ounces
To make	1000 Cc. or 25 fl.ounces

Mix and filter if necessary.

This is one of the three elixirs official in the U. S. P. It is simply an Elixir of Liquorice, and is used as an addition to other medicines for the purpose of dilution, solution or to make them more palatable.

Elixir Adjuvans of the National Formulary is as follows:

Sweet Orange Peel, recently dried,	2 ounces
Wild Cherry,	4 ounces
Glycyrrhiza, (Russian) peeled,	8 ounces
Coriander,	1 ounce
Alcohol,	
Water, of each, a sufficient quantity,	
Syrup, enough to make	1 gallon

Grind the wild cherry to a moderately coarse (No. 40) powder, moisten it with four fluid ounces of water and set it aside for twelve hours. Reduce the other solids also to a moderately coarse (No. 40) powder, mix this intimately with the wild cherry, and having mixed one volume of alcohol with two volumes of water, moisten the powder with four fluid ounces of the mixture, then pack tightly in a per-

colator. Gradually pour menstruum on top until 96 fluid ounces of percolate are obtained. Mix this with 32 fluid ounces of syrup and filter.

This preparation is chiefly intended as a vehicle, particularly for acid or saline remedies.

Elixir Aletris Compound.

Under this title many manufacturers put out an elixir which is similar to or the same as "Aletris Cordial." It is also quite similar to Elixir Helonias Compound, which see.

Unicorn Root,	1	ounce
False Unicorn Root,	1	ounce
Mitchella, or Squaw Vine,	1	ounce
Cramp Bark,	$\frac{1}{2}$	ounce
Blue Cohosh,	$\frac{1}{2}$	ounce
Sugar,	5	ounces
Prepared Flavoring,	1	ounce
Elixir Percolating Menstruum, q. s. to make	1	pint

Percolate the drugs with the percolating menstruum until 13 ounces are obtained; dissolve the sugar in the percolate and add the prepared flavoring. This may be made with fluidextracts and elixir if desired.

Elixir Alkaline. Elixir Rhubarb Compound with Pancreatin.

This is nearly double the strength of the elixir rhubarb and potassium, with the addition of 4 grains of saccharated pancreatin to each fluid ounce. It may be made as follows:

Rhubarb fluidextract,	288	minims
Cinnamon tincture,	1	fl.ounce
Hydrastis fluidextract,	144	minims
Peppermint spirit,	128	minims
Potassium Bicarbonate,	288	grains
Pancreatin, saccharated,	64	grains
Elixir, sufficient to make	1	pint

Mix the liquids with the elixir and dissolve the potassium bicarbonate in the mixture by rubbing it in a mortar. Let stand and strain or filter. The dose is from a teaspoonful to a tablespoonful, as an antacid, stomachic and laxative. See also Elixir Rhubarb and Potassium.

Elixir Aloin.

Aloin,	32	grains
Elixir,	16	fl.ounces

Dissolve the aloin by rubbing it with the elixir in a mortar, and filter. A fl.drachm contains $\frac{1}{4}$ grain of aloin. Dose, a teaspoonful to a tablespoonful as a laxative or cathartic.

Elixir Aloin and Strychnine.

Strychnine Sulphate,	2 grains
Hot Water,	2 fl.drachms
Elixir Aloin, as above,	16 fl.ounces

Rub the strychnine fine in the mortar and dissolve it by rubbing first with the hot water and then with separate portions of the elixir, and filter. A fl.drachm contains $\frac{1}{4}$ grain of aloin and $\frac{1}{64}$ grain strychnine. The dose is a teaspoonful.

Elixir Aloin, Strychnine and Belladonna.

Aloin,	32 grains
Strychnine,	2 grains
Belladonna extract,	8 grains
Hot Water,	1 fl.ounce
Elixir,	16 fl.ounces

Rub the strychnine to a fine powder in a mortar and dissolve it in the hot water, soften the belladonna extract with the hot solution, add the aloin and rub them with the elixir until dissolved. After standing, filter. This represents in the form of an elixir a favorite combination much prescribed by physicians in the form of pills. It will therefore meet with favor if introduced to the notice of physicians. A fl.drachm contains $\frac{1}{4}$ grain aloin, $\frac{1}{64}$ grain strychnine, and $\frac{1}{16}$ grain belladonna extract. The dose is a teaspoonful.

Elixir Amarum. Bitter Elixir.

Wormwood extract,	2 parts
Peppermint oil-sugar,	1 part
Water,	5 parts
Aromatic tincture,	1 part
Powdered Talc,	3 parts

Dissolve the wormwood extract and the peppermint oil-sugar (oleo-saccharate) in the water, add the tinctures and the powdered talc, allow to stand 8 days with occasional agitation, and filter.

An aromatic bitter elixir, official in the Ph. Ger. 1900.

Elixir Ammonium Bromide.

Ammonium Bromide,	640 grains
Elixir, sufficient to make	1 pint

Dissolve the salt in the elixir and filter.

A fl.drachm contains 5 grains of ammonium bromide. The dose is from a teaspoonful to a tablespoonful.

Elixir Ammonium Chloride. Elixir Ammonia Muriate.

Ammonium Chloride, in powder,	1280 grains
Elixir, sufficient to make	1 pint

Dissolve the salt in the elixir and filter.

A fl.drachm contains 10 grains ammonium chloride. The dose is a teaspoonful or more.

Elixir Ammonium Valerate.

Ammonia Water, 10%, q. s., about	1½ fl.drachms
Ammonium Valerate,	256 grains
Elixir,	14 fl.ounces
Syrup,	1½ fl.ounces

Dissolve the valerate in the elixir, and add the ammonia water to neutralize the solution, then add the syrup, and color with carmine solution or other red coloring.

A fl.drachm contains 2 grains of the salt. The dose is a teaspoonful to a dessertspoonful or more as an anodyne, nervine and hypnotic. The object of adding the ammonia water is to neutralize the free acid of the ammonium valerate, which is always present. The quantity specified is generally about right, but it may be tested with test-paper for excess of acid and made just right. This formula makes the preparation generally used, but some houses furnish an elixir containing fluidextract of valerian 1 fl.ounce, in each pint, in addition to the above formula. Such an elixir may readily be made if desired, by adding 1 fl.ounce fluidextract valerian and filtering. It is thought to be more effective when thus made.

Elixir Ammonium Valerate with Hydrated Chloral.

Hydrated Chloral, crystallized,	640 grains
Elixir Ammonium Valerate, q. s. to make	1 pint

Dissolve the hydrated chloral in the elixir.

A fl.drachm contains 5 grains hydrated chloral combined with the elixir. The dose is a teaspoonful to a dessertspoonful or more as a hypnotic and anodyne.

Elixir Ammonium Valerate and Iron.

Iron Pyrophosphate,	128 grains
Water,	1 fl.ounce
Elixir Ammonium Valerate,	15 fl.ounces

Dissolve the iron salt in water by the aid of heat, and add the elixir.

A fl.drachm contains 1 grain of iron and 2 grains of ammonium valerate. The dose is a teaspoonful to a dessertspoonful. Other salts of iron may be added to the elixir ammonium valerate in the same way.

Elixir Ammonium Valerate and Morphine.

Morphine Sulphate,	16 grains
Elixir Ammonium Valerate,	1 pint

Dissolve the morphine salt in the elixir.

A fl.drachm contains 2 grains ammonium valerate and ⅛ grain morphine sulphate. The dose is a teaspoonful. This is one of the most desirable combinations as a hypnotic and anodyne.

Elixir Ammonium Valerate and Quinine.

Quinine Sulphate,	64 grains
Ammonium Valerate,	256 grains
Ammonia Water,	20 minims
Elixir, sufficient to make	1 pint

Rub the quinine salt to a smooth mixture with the elixir, and add the valerate. When the quinine is entirely dissolved, add the ammonia water. This may be colored with a little carmine coloring if desired.

A fl.drachm contains 2 grains of ammonium valerate and $\frac{1}{2}$ grain quinine sulphate. The dose is a teaspoonful to a dessertspoonful or more. A great variety of combinations may be made with this elixir by adding other salts, as strychnine, iron etc.

Elixir Ammonium Valerate and Strychnine.

Strychnine Sulphate,	2 grains
Elixir Ammonium Valerate,	1 pint

Dissolve the strychnine salt by rubbing with separate portions of the elixir, and filter, or add 2 fl.drachms of strychnine solution to a pint of the elixir.

A fl.drachm contains 2 grains ammonium valerate and $\frac{1}{64}$ grain strychnine. The dose is a teaspoonful.

An elixir is also made containing double the quantity of strychnine, or 4 grains to a fl.drachm.

Elixir Analgesic.

Acetanilide,	256 grains
Sodium Bromide,	32 grains
Caffeine Citrate,	64 grains
Camphor Monobromate,	32 grains
Sodium Bicarbonate,	256 grains
Elixir, sufficient to make	1 pint

Rub the powders in a mortar with separate portions of the elixir to dissolve.

A fl.drachm contains 2 grains acetanilide, $\frac{1}{4}$ grain each, sodium bromide and camphor monobromate, $\frac{1}{2}$ grain caffeine citrate and 2 grains sodium bicarbonate.

Elixir Anise. Anise Seed Cordial.

Anise Seed, in fine powder,	1 ounce
Elixir, sufficient to make	1 pint

Percolate or macerate and filter.

Or from the oils as directed in the New York and Brooklyn Formulary:

Oil of Anise, Saxony,	25 minims
Oil of Fennel, ("Sweet"),	5 minims
Oil of Bitter Almonds,	2 minims
Deodorized Alcohol,	4 fl.ounces
Syrup,	10 fl.ounces
Water,	2 fl.ounces
Calcium Phosphate,	120 grains

Mix the oils with the deodorized alcohol, add the syrup and water, and set aside for 12 hours; then mix with calcium phosphate and filter clear.

This elixir is used as an aromatic vehicle, or addition to medicines, especially for children.

Elixir Anti-Asthmatic (Dr. Hare).

Sodium Iodide,	256 grains
Sodium Bromide,	256 grains
Fluidextract Euphorbia Pilulifera,	384 minims
Spirit of Nitroglycerin, U. S.,	65 minims
Tincture Lobelia,	32 minims
Elixir, sufficient to make	1 pint

Mix the liquids with 12 fl.ounces of elixir, dissolve the salts in the mixture and add enough elixir to make 1 pint. Dose 1 to 2 fl.drachms.

Elixir Antimony and Potassium Tartrate. Elixir Tartar Emetic.

Antimony and Potassium Tartrate,	16 grains
Elixir,	1 pint

Dissolve the salt by rubbing with separate portions of the elixir and filter.

A fl.drachm contains $\frac{1}{8}$ grain tartar emetic. The dose is a teaspoonful to a dessertspoonful. This elixir is a very convenient form in which to exhibit this salt, as the dose may be regulated as desired.

Elixir Antipyrine.

Antipyrine,	640 grains
Elixir, sufficient to make	1 pint

Dissolve the antipyrine in the elixir by rubbing them together in a mortar.

A fl.drachm contains 5 grains of the salt. The dose is a teaspoonful or more.

ELIXIR AROMATICUM. U. S. Aromatic Elixir.

This is official in the U. S. P. as follows:

Compound Spirit of Orange,	12 Cc. or 12	fl.drachms
Syrup,	375 Cc. or 48	fl.ounces
Purified Talc,	30 Gm. or 3 $\frac{3}{4}$	ounces av.
Alcohol,		

Distilled Water, each a sufficient quantity

To make 1000 Cc. or 1 gallon

"To the compound spirit of orange add enough alcohol to make 250 Cc. (or 32 fl.ounces). To this solution add the syrup in several portions, agitating after each addition, and afterwards add, in the same manner 375 Cc. (or 48 fl.ounces) of distilled water. Mix the purified talc intimately with the liquid, and then filter through a wetted filter, returning the first portions of the filtrate until a transparent liquid is obtained. Lastly, wash the filter with a mixture of 1 volume of alcohol and 3 volumes of distilled water until the product measures 1000 Cc. (or 1 gallon)." < U. S.

This is a "simple elixir" of orange flavor which may be used as a basis for other elixirs, a diluent for active medicines or a solvent for salts exhibited in the form of elixirs. Its simple orange flavor, although generally agreeable, is not so satisfactory for most purposes as the "Elixir" directed in the formulas for elixirs in this section.

Elixir Aromatic.

Several elixirs are known by the name of Aromatic Elixir; in fact, it is the general name for elixirs as a class, some manufacturers calling all their elixirs aromatic elixirs; but the name is applied in pharmacy generally to the simple or aromatic elixir prepared from substances instead of from their oils. The following formulæ may be used:

Orange Peel, fresh, cut fine,	4 ounces av.
Lemon Peel, fresh, cut fine,	1 ounce av.
Coriander Seed, in fine powder,	1 ounce av.
Caraway Seed, in fine powder,	1 ounce av.
Anise Seed, in fine powder,	1 ounce av.
Cinnamon Bark, (Saigon), in fine powder,	1 ounce av.
Sugar,	2½ pounds
Alcohol,	2½ pints
Water, sufficient to make	1 gallon

Macerate the drugs for 48 hours with the alcohol, then add 4 pints of water, and continue the maceration for 48 hours longer, pour off the liquid, transfer the drugs to a percolator, and percolate with the poured-off tincture until it has all passed, then add water through the percolator to make the measure 6½ pints; filter clear through a little magnesium carbonate, and dissolve the sugar in the filtrate, adding water if necessary to make a gallon.

This elixir is used the same as simple elixir as a base for other elixirs, and as a vehicle for medicines etc., but it is inadmissible for making elixirs containing iron, bismuth, and other salts which are changed or precipitated by astringent principles.

Elixir Arsenic. Elixir Potassium Arsenite.

Fowler's Solution of Arsenic,	640 minims
Elixir, sufficient to make	1 pint

Mix them. A fl.drachm contains 5 minims of Fowler's solution. Dose, a teaspoonful. This is a safe and convenient preparation, the dose of arsenic being regulated as desired without danger. The combinations of arsenic and quinine will be found under quinine elixirs.

Elixir Arsenic and Mercury Iodide.

Donovan's Solution of Arsenic	
and Mercury Iodide,	640 minims
Elixir, sufficient to make	1 pint

Mix them. A fl.drachm contains 5 minims Donovan's Solution. Dose, a teaspoonful.

Elixir Arsenic and Strychnine.

Strychnine Sulphate,	2 grains
Elixir Arsenic,	1 pint

Dissolve the strychnine sulphate by rubbing with the elixir in a mortar, or add 2 drachms of strychnine solution to a pint of the elixir of arsenic and filter. A fl.drachm contains 5 minims of Fowler's Solution and $\frac{1}{64}$ grain strychnine sulphate.

Elixir Atropine.

Atropine Sulphate,	2 grains
Elixir,	1 pint

Dissolve the salt by rubbing in a mortar with separate portions of the elixir, and filter if necessary. A fl.drachm contains $\frac{1}{64}$ grain of atropine sulphate. For internal use this is a safe and reliable preparation. It may be given in doses of from 10 to 20 minims.

Elixir Beef.

Liebig's Extract of Beef,	1 ounce av.
Citric Acid,	5 grains
Elixir, sufficient to make	1 pint

Rub the extract with the elixir in a mortar, add the citric acid, and after standing for some time filter.

As each ounce of Liebig's Extract of Meat represents the soluble constituents of 32 ounces of fresh beef, a tablespoonful ($\frac{1}{2}$ fl.ounce) of the elixir represents one ounce of fresh beef. The dose is from a dessert to a tablespoonful or more. Many manufacturers make the preparations of beef with only $\frac{1}{2}$ ounce of beef extract to a pint.

Elixir Beef and Iron.

Iron and Ammonium Citrate,	64 grains
Elixir of Beef,	1 pint

Dissolve the iron salt by rubbing with separate portions of the elixir, filter if necessary; or add to the elixir an equivalent quantity of solution iron and ammonium citrate. Half fl.ounce (a tablespoonful) of this elixir represents one ounce of fresh beef and and two grains of

soluble citrate of iron. The dose is from a dessert to tablespoonful or more. This elixir is preferable in many respects to Wine of Beef and Iron, for the reason that it is much more uniform, and will not precipitate as the wine is liable to do.

Elixir Beef, Iron and Cinchona.

Quinine Sulphate,	5 grains
Cinchonidine Sulphate,	10 grains
Iron and Ammonium Citrate,	64 grains
Elixir of Beef,	1 pint

Rub the salts with separate portions of the elixir until dissolved, and filter if necessary.

Half a fl.ounce (a tablespoonful) represents one ounce of fresh beef, and the more important alkaloidal salts of about 8 grains of cinchona, with two grains of soluble citrate of iron. The dose is from a teaspoonful to a tablespoonful.

This is preferable to the Wine of Beef, Iron and Cinchona, for the same reasons as above stated.

Elixir Belladonna.

Belladonna Leaves, in coarse powder,	256 grains
Elixir, sufficient to make	1 pint

Macerate the powder with the elixir as directed and filter.

A fl.drachm represents 2 grains of belladonna leaves. The dose is from 20 to 60 minims, or more. This is a very convenient preparation, as the dose of belladonna can be better regulated than in stronger preparations.

This may be conveniently prepared from fl.extract of belladonna leaves by mixing 16 minims of the fluid extract with enough elixir to make 1 fl.ounce.

Elixir Berberine.

Berberine Sulphate, or Hydrochloridè,	64 grains
Alcohol,	2 fl.ounces
Elixir,	14 fl.ounces

Dissolve the berberine salt first in the alcohol by gentle heat of water-bath, then add the elixir.

A fl.drachm contains $\frac{1}{2}$ grain of the salt. The dose is from 1 to 2 teaspoonfuls.

The berberine salts were formerly known by the name of Hydrastin, as muriate of hydrastin etc.

Elixir Berberine, Bismuth and Iron.

Bismuth and Ammonium Citrate,	64 grains
Elixir Berberine and Iron,	1 pint

Rub the bismuth salt with the elixir, add a few drops of ammonia water to dissolve, and, after standing, filter.

A fl.drachm contains $\frac{1}{2}$ grain each of bismuth, iron and berberine.
Dose, 1 to 2 teaspoonfuls.

Elixir Berberine and Iron.

Iron Pyrophosphate,	64 grains
Hot Water,	1 fl.ounce
Elixir Berberine,	15 fl.ounces

Dissolve the iron salt in the hot water and add the elixir to the solution.

A fl.drachm contains about $\frac{1}{2}$ grain each of iron and berberine.
Dose, 1 to 2 teaspoonfuls.

Elixir Bismuth.

Bismuth and Ammonium Citrate,	256 grains
Elixir, sufficient to make	1 pint
Ammonia Water, a sufficient quantity.	

Rub the bismuth salt with two ounces of the elixir in a mortar, and gradually add ammonia water drop by drop, until the turbid solution becomes clear, or nearly clear, then add the remainder of the elixir, and after standing a few hours, filter. The ammonia water is added to dissolve the insoluble bismuth citrate that may be present in the compound salt. This depends much upon the age and exposure of the salt, as it loses ammonia when exposed. An equivalent quantity of solution of bismuth citrate may be used, instead of the ammonium citrate. A fl.drachm contains 2 grains of soluble bismuth citrate. The dose is 1 to 2 teaspoonfuls.

Elixir Bismuth and Iron.

Iron and Ammonium Citrate,	128 grains
Elixir Bismuth,	1 pint

Rub the iron salt with separate portions of the liquid to dissolve.

A fl.drachm contains 2 grains soluble citrate of bismuth and 1 grain soluble iron citrate. Dose, 1 to 2 teaspoonfuls.

Elixir Bismuth, Iron and Strychnine.

Strychnine Sulphate,	1 grain
Iron and Ammonium Citrate,	128 grains
Elixir of Bismuth,	8 fl.ounces
Elixir,	8 fl.ounces

Rub the strychnine salt and iron salt with separate portions of elixir until dissolved; then add the elixir bismuth, and after standing, filter.

A fl.drachm contains $\frac{1}{128}$ grain strychnine and 1 grain each soluble citrates of bismuth and iron. The dose is from 1 to 2 teaspoonfuls.

This may be made by adding equivalent quantities of solution of strychnine sulphate and iron citrate to elixir bismuth, mixed with an equal quantity of elixir.

Elixir Bismuth and Strychnine.

Strychnine Sulphate,	2 grains
Elixir Bismuth,	1 pint

Dissolve the strychnine by rubbing with the elixir bismuth, or add to the elixir bismuth 2 fl.drachms solution strychnine sulphate, and, after standing, filter.

A fl.drachm of this elixir contains 2 grains of soluble bismuth and one sixty-fourth grain sulphate of strychnine. The dose is $\frac{1}{2}$ to 1 teaspoonful.

Elixir Blackberry.

Blackberry Root, in coarse powder,	2 ounces av.
Elixir Percolating Menstruum,	1 pint
Sugar,	5 ounces av.
Soluble Flavoring,	1 fl.ounce

Make by percolation as directed. This may also be made by mixing:

Fluidextract of Blackberry,	2 fl.ounces
Elixir,	14 fl.ounces

and filtering.

A fl.drachm contains 7 grains of blackberry root. The dose is from 1 to 2 teaspoonfuls.

Elixir Black Cohosh or Cimicifuga.

Black Cohosh, in powder,	2 ounces av.
Elixir Percolating Menstruum,	1 pint
Sugar,	5 ounces av.
Soluble Flavoring,	1 fl.ounce

Make by percolation as directed.

It may also be made by mixing:

Fluidextract Black Cohosh,	2 fl.ounces
Elixir,	12 fl.ounces
Alcohol,	2 fl.ounces

After standing a few days, filter. A fl.drachm contains 7 grains of black cohosh. The dose is from 1 to 2 teaspoonfuls.

Elixir Black Cohosh Compound.

Black Cohosh, in coarse powder,	1 ounce av.
Colchicum Root, in coarse powder,	1 ounce av.
Potassium Iodide,	256 grains
Percolating Menstruum,	1 pint
Sugar,	5 ounces av.
Soluble Flavoring,	1 fl.ounce

Make by percolation as directed, and dissolve the iodide in the percolate.

This may also be made by mixing one ounce each of fl.extract of black cohosh and colchicum with 14 ounces of elixir, and dissolving the iodide in the elixir.

A fl.drachm contains $3\frac{1}{2}$ grains each of black cohosh and colchicum, and 2 grains of potassium iodide. The dose is a teaspoonful or more for rheumatism and neuralgia.

Elixir Black Haw.

Fluidextract Black Haw,	2 fl.ounces
Elixir,	14 fl.ounces

Mix them. A fl.drachm represents 7 grains of Black Haw.

Compound Elixirs of Black Haw are given under Elixir Viburnum Compound, which see.

Elixir Brom-Acetan-Caffeine.

Potassium Bromide,	640 grains
Acetanilide,	256 grains
Caffeine,	128 grains
Glycerin,	4 fl.ounces
Alcohol,	4 fl.ounces
Water,	5 fl.ounces
Prepared Flavoring,	1 fl.ounce

Dissolve the acetanilide in the alcohol by the aid of heat of a water-bath, add the water and glycerin, previously heated together, and dissolve the potassium bromide and caffeine in the mixture, then add the prepared flavoring. Color if desired with a little caramel, and filter. A fl.drachm contains 5 grains potassium bromide, 2 grains acetanilide, and one grain caffeine. This is an excellent combination for headache, nervous irritation, neuralgia, pain etc. The dose is 1 to $1\frac{1}{2}$ teaspoonful.

Elixir Bromides Compound. Elixir Five Bromides.

Sodium Bromide,	384 grains
Potassium Bromide,	384 grains
Calcium Bromide,	384 grains
Lithium Bromide,	384 grains
Ammonium Bromide,	384 grains
Elixir, sufficient to make	1 pint

Dissolve the bromides in the elixir by the aid of gentle heat. A fl.drachm contains 3 grains each of the five bromides. Dose a teaspoonful, in water.

Elixir Brom-Iodide of Calcium Compound.

Tilden's Solution of Iodo-Bromide Calcium Compound,	$2\frac{1}{2}$ fl.ounces
Fluidextract of Sarsaparilla Compound,	1 fl.ounce
Elixir,	8 fl.ounces
Syrup, sufficient to make	1 pint

Mix and filter if necessary.

Tilden's Elixir Iodo-Bromide of Calcium Compound is a proprietary preparation which has had a large sale. The solution of iodo-bromide of calcium, as it is named by Tilden & Co., is prepared from the Bittern which remains after the crystallization of salt from natural salt-water springs. It contains iodine, bromine, calcium, and a number of other substances in solution. As this solution cannot be economically made from the substances themselves, and would be unlike the proprietary preparation with which the public is familiar, it is better to make the elixir when desired from Tilden's solution, as above.

This elixir is used as an alterative, in doses of a teaspoonful or more.

Elixir Bromo-Caffeine.

Potassium Bromide,	640 grains
Caffeine,	128 grains
Elixir, sufficient to make	16 fl.ounces

Dissolve the potassium bromide and the caffeine in the elixir and filter. This may be colored if desired with a little caramel. A fl. drachm represents 5 grains potassium bromide, and one grain caffeine. The dose is a teaspoonful to a dessertspoonful for headache etc.

Elixir Buchu.

Buchu Leaves, in coarse powder,	4 ounces av.
Elixir Percolating Menstruum, q. s. about	18 fl.ounces
Sugar,	5 ounces av.
Soluble Flavoring,	1 fl.ounce

Make by percolation as directed.

This elixir may be made from Fluidextract Buchu as follows:

Fluidextract Buchu,	4 fl.ounces
Magnesium Carbonate,	2 drachms
Elixir,	12 fl.ounces

Rub the fl.extract with magnesium carbonate in a mortar, and the elixir, and filter, adding enough elixir through the filter to make a pint.

A fl.drachm represents 14 grains buchu. The dose is a teaspoonful to a tablespoonful.

The New York and Brooklyn Formulary directs Elixir Buchu to be prepared from fluidextract buchu, 2 fl.ounces; fluidextract triticum, 1 fl.ounce; tincture vanilla, 1 fl.drachm; syrup of coffee, 6 fl. ounces; magnesium carbonate, 120 grains, with simple elixir enough to make a pint.

The Nat. Formulary directs: fluidextract of buchu, 2 fl.ounces; alcohol, 1 fl.ounce; syrup, 1 fl.ounce; purified talcum, 120 grains; adjuvant elixir, enough to make 16 fl.ounces. A fl.drachm represents about $7\frac{1}{2}$ grains buchu.

Elixir Buchu Compound. Elixir Buchu and Pareira Brava.

Buchu, in coarse powder,	2 ounces av.
Stone Root, in coarse powder,	1 ounce av.
Pareira Brava, in coarse powder,	1 ounce av.
Elixir Percolating Menstruum, q. s., about	18 fl.ounces
Sugar,	5 ounces av.
Soluble Flavoring,	1 fl.ounce

Make by percolation as directed.

This elixir may be made by mixing the fl.extracts of the drugs with elixir as directed.

A fl.drachm represents 7 grains buchu, $3\frac{1}{2}$ grains each, Pareira Brava and Stone Root. The dose is from a teaspoonful to a table-spoonful.

Several other preparations are furnished under the name of elixir buchu compound.

The Nat. Form. directs: Compound fluidextract buchu, 4 fl.ounces; alcohol, 1 fl.ounce; syrup, 1 fl.ounce; purified talcum, 120 grains; adjuvant elixir, enough to make 16 fl.ounces. A fl.drachm represents 15 minims of compound fluidextract of buchu.

Elixir Buchu, Juniper and Potassium Acetate.**Diuretic Elixir, Wayne's Diuretic Elixir.**

Buchu, in coarse powder,	2 ounces av.
Juniper Berries, crushed,	1 ounce av.
Potassium Acetate,	640 grains
Soluble Flavoring,	1 fl.ounce
Sugar,	5 ounces av.
Elixir Percolating Menstruum, q. s., about	18 fl.ounces

Make by percolation as directed.

This may also be made with fluidextracts of buchu and juniper mixed with elixir, filtered through magnesium carbonate, and potassium acetate dissolved in the filtrate.

A fl.drachm contains 7 grains buchu, $3\frac{1}{2}$ grains juniper, and 5 grains potassium acetate. The dose is from a teaspoonful to a table-spoonful.

By adding to this 1 fl.ounce of fluidextract of uva ursi the **Elixir Buchu, Juniper, Uva Ursi and Potassium Acetate** may be made.

Elixir Buchu and Potassium Acetate.

The Nat. Form. gives the following formula:

Potassium Acetate,	640 grains
Elixir Buchu, enough to make	16 fl.ounces

Dissolve the potassium acetate in about 12 fl.ounces of elixir buchu, filter if necessary, and add enough elixir buchu to make the measure

16 fl.ounces. A fl.drachm represents 5 grains potassium acetate and about 7 grains buchu.

Elixir Caffeine.

The National Formulary formula is:

Caffeine,	128 grains
Diluted Hydrobromic Acid,	32 grains
Syrup of Coffee,	4 fl.ounces
Aromatic Elixir, enough to make	16 fl.ounces

Rub the caffeine in a mortar with the diluted hydrobromic acid and about 2 fl.ounces of the aromatic elixir, until solution is effected. Then add the syrup of coffee and lastly enough aromatic elixir to make 16 fl.ounces. Filter if necessary.

A fl.drachm contains 1 grain of caffeine.

Elixir Calcium Bromide.

Calcium Bromide,	640 grains
Elixir, sufficient to make	1 pint

Dissolve the salt in the elixir and filter.

A fl.drachm contains 5 grains calcium bromide. The dose is from 1 to 2 teaspoonfuls.

Elixir Calcium Hypophosphite.

Calcium Hypophosphite,	256 grains
Elixir,	1 pint

Rub the salt to a fine powder and dissolve by rubbing with separate portions of the elixir.

A fl.drachm contains 2 grains calcium hypophosphite.

The dose is a teaspoonful to a dessertspoonful.

Elixirs of other hypophosphites, as sodium hypophosphite etc., may be made in the same proportion.

Elixir Calcium Iodide.

Calcium Iodide,	128 grains
Elixir,	1 pint

Dissolve the calcium iodide in the elixir.

A fl.drachm contains 1 grain of the salt. The dose is a teaspoonful or more.

Elixir Calcium Lactophosphate.

Solution Calcium Lactophosphate,	2 fl.ounces
Elixir,	14 fl.ounces

Mix and filter.

A fl.drachm contains 2 grains of calcium lactophosphate. The dose is a teaspoonful or two.

Elixir Calcium Lactophosphate with Pepsin.

Pepsin, saccharated, 256 grains

Elixir Calcium Lactophosphate, 1 pint

Macerate the pepsin in the elixir for several days and filter.

A fl.drachm contains 2 grains each lime lactophosphate and pepsin.

A great variety of other combinations of the lactophosphates with other substances may be made up in the form of elixirs, by adding the solutions of lactophosphates to the required elixirs, or other substances to elixirs of lactophosphates.

Elixir of Calisaya or Cinchona.

Elixirs of calisaya or cinchona and their compounds have been the best known and most popular of any brought to the notice of the public. Some manufacturers have introduced them as elixir "calisaya," while others have adopted the name "cinchona," but the former is probably the most popular name.

The simple elixir of calisaya or cinchona is much prescribed as a tonic, and is used as the base of compound elixirs of calisaya or cinchona. It may be made either from the bark or the alkaloidal salts.

When made from the bark the elixir must be "detannated" for combining with salts of iron; but when made from the alkaloidal salts this is avoided, and the elixir designed to be combined with iron is now generally made from the salts. The following are the formulas for making elixir calisaya:

Made from the Bark, Detannated.

Calisaya Bark,	8 ounces av.
Orange Peel, fresh,	8 ounces av.
Cinnamon Bark, "Saigon,"	1½ ounces av.
Coriander Seed,	1½ ounces av.
Red Rose Leaves,	1½ ounces av.
Nutmeg,	½ ounce av.
Star Anise,	½ ounce av.
Sugar,	2½ pounds
Alcohol, deodorized,	38 fl.ounces
Water, sufficient to make	1 gallon

Grind the calisaya bark, cinnamon, coriander, nutmeg and anise to a No. 50 powder, and having mixed a pint of alcohol with half a pint of water, moisten the powder with half a pint of the mixture, and macerate in a warm place for one day, then transfer to the water-bath percolator, pack firmly, pour upon it the remainder of the menstruum, and set in a warm place for one day. Then heat very moderately, and after one hour, begin to percolate, adding water to the drugs after the liquid has disappeared from the surface, and continuing the heat and percolation until 4 pints have passed. To this add the whites of

3 eggs, previously beaten with a portion of the percolate, and allow to stand one day; then heat the liquid to 190°F. for 5 minutes and set aside to cool; when cool filter through a muslin strainer. Chop the orange peel fine, reduce the red rose leaves to a coarse powder, and having mixed them together, put in a closed vessel with the remainder (22 fl.ounces) of the alcohol. Macerate in a warm place, with occasional agitation, for two days, then pour off the liquid and reserve. Transfer the drugs, (orange and rose) to a conical percolator, and percolate first with the detannated calisaya percolate, and then with water until 5 pints have passed; add this to the reserved portion, dissolve the sugar in the liquid, add enough water to make 1 gallon, and, after standing a few days, filter through double filter paper.

Although this is a little more trouble to make than many of the elixirs, it leaves nothing to be desired for those who wish a first-class elixir calisaya made from the bark.

This elixir may be colored if desired with cochineal coloring and caramel. When dispensed as elixir calisaya it is generally colored, but left plain for making compounds. This elixir may be made from the fluidextract of calisaya bark by mixing 1 fl.ounce with a pint of elixir, adding the white of an egg, agitating, and after standing 24 hours, heating to 190°F., and when cool filtering.

A fl.drachm represents about 4 grains of calisaya, with aromatics. The dose is from a teaspoonful to a tablespoonful.

Elixir Calisaya or Cinchona made from the Alkaloidal Salts.

Quinine Sulphate,	60 grains
Cinchonidine Sulphate,	90 grains
Citric Acid,	20 grains
Ammonia Water, sufficient, or	1 fl.drachm
Elixir, sufficient to make	1 gallon

Rub the quinine and the cinchonidine salts with half a pint of the elixir, and the citric acid with another half pint, and mix the solutions; add to the mixture 7 pints of the elixir, and set in a warm place until the solution is clear; then add enough ammonia water to neutralize the acid and filter. (Before the ammonia water is added the elixir has a fluorescent or bluish appearance. Enough ammonia should be added to remove this, but not leave any odor of ammonia in the preparation after shaking. The quantity specified is correct if the official 10 percent. ammonia water is used).

If it is desired to dispense this as elixir calisaya, it may be colored with cochineal and caramel coloring, but if for combining, it should not be colored.

This elixir represents the more important properties of the bark in about the same proportion as contained in an average good quality of bark. The dose is from a teaspoonful to a tablespoonful.

Elixir Calisaya with Beef Extract.

Liebig's Extract of Meat,	$\frac{1}{2}$ ounce av.
Elixir Calisaya,	1 pint

Rub the extract with the elixir until they are uniformly mixed, macerate for a few days and filter.

The dose is from a dessert to a tablespoonful.

Elixir Calisaya and Bismuth.

Bismuth and Ammonium Citrate,	128 grains
Water,	1 fl.ounce
Elixir Calisaya,	15 fl.ounces

Dissolve the bismuth in the water, by the aid of a few drops of ammonia water, add the elixir, and filter; or add $\frac{1}{2}$ fl.ounce solution of bismuth citrate to a pint of elixir calisaya.

A fl.drachm contains 1 grain of bismuth combined with elixir calisaya. The dose is one to two teaspoonfuls.

Elixir Calisaya, Bismuth and Pepsin.

Bismuth and Ammonium Citrate,	128 grains
Elixir Calisaya and Pepsin,	1 pint

Dissolve the bismuth salt in 1 ounce of water, by the aid of a few drops of ammonia water, and add to the elixir.

A fl.drachm contains 2 grains pepsin and 1 grain bismuth, combined with elixir calisaya.

Elixir Calisaya, Bismuth and Strychnine.

Strychnine Sulphate,	2 grains
Elixir Calisaya and Bismuth,	5 grains

Dissolve the strychnine salt by rubbing with separate portions of the elixir, or add 2 fl.drachms solution of strychnine to a pint of the elixir and filter.

A fl.drachm contains 1 grain of bismuth, $\frac{1}{64}$ grain strychnine combined with elixir calisaya. The dose is a teaspoonful.

Elixir Calisaya Ferrated.**Elixir Calisaya with Iron Citrate. Ferrated Elixir Cinchona.**

Iron and Ammonium Citrate,	128 grains
Elixir Calisaya,	1 pint

Dissolve the iron salt by rubbing with successive portions of the elixir, or use an equivalent quantity of solution iron and ammonium citrate.

A fl.drachm contains 1 grain of the iron salt combined with elixir calisaya. The dose is from 1 to 2 teaspoonfuls or more.

The elixir of calisaya and iron citrate is of a dark wine color, similar in appearance to Weyth's Ferrated Elixir of Cinchona.

Elixir Calisaya Ferrated with Bismuth.**Elixir Calisaya, Iron and Bismuth Citrate. Ferrated Elixir Cinchona with Bismuth.**

Bismuth and Ammonium Citrate,	128 grains
Iron and Ammonium Citrate,	128 grains
Water,	1 fl.ounce
Elixir Calisaya,	15 fl.ounces

Dissolve the bismuth in the water by the aid of a few drops of ammonia water; dissolve the iron salt in the elixir by rubbing with successive portions of it; then add the solution of bismuth and filter.

This may be made by adding $\frac{1}{2}$ ounce each, solution of bismuth and ammonium citrate, and solution of iron and ammonium citrate to 15 ounces of elixir calisaya.

A fl.drachm contains 1 grain bismuth and 1 grain iron, combined with elixir calisaya. Dose, a teaspoonful or more.

Elixir Calisaya Ferrated, with Bismuth and Strychnine.**Elixir Calisaya, Iron, Bismuth and Strychnine.****Ferrated Elixir Cinchona with Bismuth and Strychnine.**

Strychnine Sulphate,	1 grain
Bismuth and Ammonium Citrate,	128 grains
Iron and Ammonium Citrate,	128 grains
Water,	1 fl.ounce
Elixir Calisaya,	15 fl.ounces

Dissolve the strychnine salt by rubbing with separate portions of the elixir, then dissolve the iron salt in the same manner. Dissolve the bismuth salt in the water by the aid of a few drops of ammonia water, and add to the solution; then, after standing, filter.

This may also be made by adding 1 fl.drachm solution of strychnine sulphate to a pint of elixir calisaya ferrated with bismuth, or by adding equivalent quantities of solutions of iron citrate, bismuth citrate and strychnine sulphate to elixir calisaya.

A fl.drachm contains 1 grain each, iron and bismuth, and $\frac{1}{128}$ grain of strychnine sulphate with elixir calisaya.

This is a dark wine-colored elixir, better known, perhaps, by the name elixir cinchona, iron, bismuth and strychnine. A light-colored elixir is made with iron pyrophosphate instead of the citrate.

Elixir Calisaya Ferrated with Strychnine.**Elixir Cinchona, Iron and Strychnine.**

Strychnine Sulphate,	1 $\frac{1}{4}$ grain
Elixir Calisaya Ferrated,	1 pint

Dissolve the strychnine salt by rubbing with separate portions of the elixir, or add 1 $\frac{1}{4}$ fl.drachm of solution strychnine sulphate to a

pint of ferrated elixir calisaya. A fl.drachm contains 1 grain of iron citrate, and $\frac{1}{100}$ grain strychnine sulphate, combined with elixir calisaya. The dose is a teaspoonful or two.

This is a dark wine-colored elixir, better known by the name elixir cinchona, iron and strychnine. Light greenish-colored elixirs of calisaya, iron and strychnine are made with soluble iron phosphate or iron pyrophosphate.

Elixir Calisaya Ferri-phosphated with Pepsin.

Elixir Calisaya, Iron and Pepsin.

Saccharated Pepsin,	256 grains
Elixir Calisaya Ferri-phosphated,	1 pint

Mix the pepsin with the elixir and macerate, with occasional agitation, for a few days, then filter. By warming to about 120°F., this may be made in a few hours.

A fl.drachm contains 2 grains each, iron phosphate and pepsin, combined with elixir calisaya. Dose, a teaspoonful to a dessertspoonful.

Elixir calisaya, iron and pepsin may also be made by combining pepsin with elixir calisaya ferrated, or elixir calisaya and iron pyrophosphate in the same manner as above directed.

Elixir Calisaya Ferri-phosphated with Pepsin and Strychnine.

Elixir Calisaya, Iron, Pepsin and Strychnine.

Strychnine Sulphate,	1¼ grain
Elixir Calisaya, Iron and Pepsin,	1 pint

Dissolve the strychnine salt by rubbing with separate portions of the elixir, or add 1¼ fl.drachm of solution strychnine sulphate to a pint of elixir calisaya, iron and pepsin.

A fl.drachm contains 2 grains each, iron phosphate and pepsin, and $\frac{1}{100}$ grain strychnine sulphate combined with elixir calisaya. Dose, a teaspoonful to a dessertspoonful.

Elixir calisaya, iron, pepsin and strychnine may also be made from elixirs of calisaya, iron and strychnine by macerating 256 grains of pepsin in a pint of the elixir, as directed.

Elixir Calisaya Ferri-phosphated with Strychnine.

Elixir Calisaya, Iron and Strychnine.

Strychnine Sulphate,	1¼ grains
Soluble Iron Phosphate,	256 grains
Water,	1½ fl.ounces
Elixir Calisaya,	14 fl.ounces

Dissolve the strychnine salt first in the water by the aid of heat, then add the soluble iron phosphate, a portion at a time, until all is dissolved, to this add the elixir calisaya, and, after standing, filter.

A fl.drachm contains 2 grains iron phosphate and $\frac{1}{100}$ grain strychnine.

nine sulphate, combined with elixir calisaya. Dose, a teaspoonful or more.

This is the best one of the elixirs calisaya, iron and strychnine. It cannot be combined with bismuth or other salts or solutions which are precipitated with acids.

Elixir Calisaya with Hypophosphites Compound.

Calcium Hypophosphite,	256 grains
Sodium Hypophosphite,	128 grains
Elixir Calisaya,	15 fl.ounces
Hypophosphorous Acid,	1 fl.ounce

Rub the hypophosphites to a fine powder, then with the elixir calisaya and add the hypophosphorous acid; when dissolved, filter.

A fl.drachm contains 3 grains hypophosphites combined with elixir calisaya. The dose is a teaspoonful.

Elixir Calisaya and Iron with Beef Extract.

Liebig's Extract of Meat,	$\frac{1}{2}$ ounce av.
Elixir Calisaya, Ferrated,	1 pint

Rub the extract with the elixir until they are uniformly mixed, macerate for a few days and filter.

The dose is a dessertspoonful or more.

Elixir Calisaya, Iron and Bismuth, with Beef Extract.

Elixir Calisaya, Iron, Bismuth and Beef.

Liebig's Extract of Meat,	$\frac{1}{2}$ ounce av.
Elixir Calisaya, Iron and Bismuth,	1 pint

Rub the extract with the elixir until they are uniformly mixed, macerate for a few days and filter.

The dose is from a teaspoonful to a dessertspoonful.

Elixir Calisaya, Iron and Bismuth, with Lactopeptine.

Lactopeptine,	256 grains
Elixir Calisaya, Iron and Bismuth,	1 pint

Mix and macerate in a warm place for several days, then filter through cloth.

A fl.drachm contains 2 grains lactopeptine, 2 grains iron and 1 grain bismuth, combined with elixir calisaya.

Dose, a teaspoonful to a dessertspoonful.

Elixir Calisaya, Iron Chloride and Strychnine.

Strychnine Sulphate,	2 grains
Elixir Calisaya with Tinct. Iron Citro-chloride,	16 fl.ounces

Dissolve the strychnine sulphate by rubbing in a mortar with separate portions of the elixir. A teaspoonful dose contains $\frac{1}{64}$ grain strychnine with elixir calisaya and citro-chloride of iron.

Many other combinations of this form of elixir calisaya and iron may be advantageously made, but it is not compatible with elixirs con-

taining bismuth. When pepsin is desired, without bismuth, in combination with calisaya, this is an excellent vehicle.

Elixir Calisaya with Lactopeptine.

Lactopeptine,	256 grains
Elixir Calisaya,	1 pint

Mix and macerate in a warm place for several days, then filter through cloth.

A fl.drachm contains 2 grains lactopeptine, combined with elixir calisaya. Dose, a dessertspoonful.

Elixir Calisaya and Iron Phosphate. Elixir Calisaya Ferri-Phosphated. Elixir Bark and Iron.

Soluble Iron Phosphate,	256 grains
Water,	1½ fl.ounces
Elixir Calisaya,	14 fl.ounces

Dissolve the iron phosphate in the water by the aid of heat and add the elixir; after standing, filter.

Elixir Calisaya and Iron Phosphate. Elixir Calisaya Ferri-Phosphated.

Elixir Calisaya and Iron Phosphate. Elixir Bark and Iron.

Soluble Iron Phosphate,	256 grains
Water,	1½ fl.ounces
Elixir Calisaya,	14 fl.ounces

Dissolve the iron phosphate in the water by the aid of heat, and add the elixir; after standing, filter.

This is a fine elixir of calisaya with soluble iron phosphate. It cannot be used for combining with ammonio-citrate of bismuth, because it is an acid solution; but for most purposes is preferable to the elixir made with iron pyrophosphate.

A fl.drachm contains 2 grains of iron phosphate combined with elixir calisaya. The dose is a teaspoonful or more. The elixirs of calisaya and iron phosphate which are called "ferri-phosphated" in this Formulary are of a light greenish color. They are the best forms of elixir "bark and iron."

Elixir calisaya and iron pyrophosphate is similar in appearance and properties to this.

Elixir Calisaya and Iron Pyrophosphate.

"Ferro-phosphorated" Elixir of Calisaya. "Ferrated Cordial Elixir."

Iron Pyrophosphate,	256 grains
Water,	1½ fl.ounces
Elixir Calisaya,	14 fl.ounces

Heat the water, and add the iron salt, a portion at a time, until all is dissolved, then add the elixir calisaya, and, after standing, filter. This may also be made by adding an equivalent quantity of solution iron pyrophosphate to the elixir calisaya.

A fl.drachm contains 2 grains of iron pyrophosphate combined with elixir calisaya.

This is similar in appearance to Elixir Calisaya and Iron Phosphate, but is a neutral instead of a slightly acid elixir. It is the popular "Ferro-phosphorated Elixir of Calisaya" which has been so long and favorably known on the market. When it is desired to make a light-colored elixir calisaya and iron to combine with bismuth, this elixir is the one used.

Elixir Calisaya, Iron Pyrophosphate and Bismuth.

Ferro-phosphorated Elixir of Calisaya with Bismuth.

Bismuth and Ammonium Citrate,	128 grains
Water,	1 fl.ounce
Elixir Calisaya and Iron Pyrophosphate,	15 fl.ounces

Dissolve the bismuth salt in the water by the aid of a few drops of ammonia water, and add the elixir calisaya and iron.

A fl.drachm contains 1 grain bismuth and 2 grains iron combined with elixir calisaya. The dose is a teaspoonful or more. This is the only light-colored elixir of calisaya and iron with which bismuth may be combined.

Elixir Calisaya, Iron Pyrophosphate, Bismuth and Pepsin.

Elixir Calisaya, Iron, Bismuth and Pepsin.

Saccharated Pepsin,	256 grains
Elixir Calisaya, Iron Pyrophosphate and Bismuth,	1 pint

Mix and macerate for several days with occasional agitation, then filter through cloth. A fl.drachm contains 2 grains each of iron and pepsin, and 1 grain of bismuth, combined with elixir calisaya. The dose is a teaspoonful or two.

Elixir Calisaya, Iron Pyrophosphate, Bismuth and Strychnine.

Elixir Calisaya, Iron, Bismuth and Strychnine.

Strychnine Sulphate,	1¼ grains
Elixir Calisaya, Iron Phosphate and Bismuth,	1 pint

Rub the strychnine salt with separate portions of the elixir to dissolve, or add 1¼ fl.drachm solution strychnine sulphate to a pint of the elixir.

A fl.drachm contains 2 grains iron, 1 grain bismuth and $\frac{1}{100}$ grain strychnine sulphate, combined with elixir calisaya. The dose is a teaspoonful or two.

Elixir Calisaya, Iron Pyrophosphate, Bismuth and Strychnine with Pepsin.

Elixir Calisaya, Iron, Bismuth, Strychnine and Pepsin.

Saccharated Pepsin,	256 grains
Elixir Calisaya, Iron, Bismuth and Strychnine,	1 pint

Mix and macerate for a few days, then filter through cloth.

This may also be made by adding $1\frac{1}{4}$ fl.drachm solution of strychnine sulphate to a pint of elixir calisaya, iron, bismuth and pepsin.

A fl.drachm contains 2 grains iron, 1 grain bismuth, 2 grains pepsin and $\frac{1}{100}$ grain strychnine sulphate, with elixir calisaya. Dose, a teaspoonful or two.

Elixir Calisaya, Iron Pyrophosphate and Strychnine.

Elixir Calisaya, Iron and Strychnine. Ferrophosphorated

Elixir of Calisaya with Strychnine.

Strychnine Sulphate, $1\frac{1}{4}$ grains

Elixir Calisaya and Iron Pyrophosphate, 1 pint

Rub the strychnine salt with separate portions of the elixir to dissolve, or add $1\frac{1}{4}$ fl.drachm of solution strychnine sulphate to a pint of the elixir, and filter.

A fl.drachm contains 2 grains of iron, and $\frac{1}{100}$ grain strychnine sulphate combined with elixir calisaya.

Elixir Calisaya and Iron with Lactopeptine.

Lactopeptine, 256 grains

Elixir Calisaya and Iron, 1 pint

Mix and macerate in a warm place for several days, then filter through cloth.

A fl.drachm contains 2 grains of lactopeptine, and 2 grains of iron phosphate, combined with elixir calisaya.

Dose, a teaspoonful to a dessertspoonful.

Elixir Calisaya, Iron and Strychnine, with Extract of Beef.

Liebig's Extract of Meat, $\frac{1}{2}$ ounce av.

Elixir Calisaya, Iron and Strychnine, 1 pint

Rub the extract with the elixir until they are uniformly mixed, macerate for a few days and filter.

The dose is a teaspoonful to a dessertspoonful.

Elixir Calisaya, Iron and Strychnine, with Lactopeptine.

Lactopeptine, 256 grains

Elixir Calisaya, Iron and Strychnine, 1 pint

Mix and macerate for several days in a warm place.

A fl.drachm contains 2 grains lactopeptine, 2 grains iron, and $\frac{1}{100}$ grain strychnine sulphate, combined with elixir calisaya.

The dose is from a teaspoonful to a dessertspoonful.

Other combinations of lactopeptine with elixir of calisaya may be made by adding 256 grains of lactopeptine to a pint of the combination desired.

Elixir Calisaya with Lactophosphates Compound.

Concentrated Solution of Phosphates,	1 fl.ounce
Lactic Acid, concentrated,	1 fl.drachm
Elixir Calisaya,	15 fl.ounces

Mix them. The dose is a dessertspoonful.

Elixir Calisaya and Pepsin.

Saccharated Pepsin,	256 grains
Elixir Calisaya,	1 pint

Mix the pepsin with the elixir, macerate for a few days and filter through cloth.

A fl.drachm contains 2 grains of pepsin combined with elixir calisaya.

The dose is a dessertspoonful or more.

Elixir Calisaya with Phosphates Compound.

This is called by some manufacturers "Elixir of Calisaya and Triplephosphates Compound."

Concentrated Solution Phosphates,	8 fl.ounces
Red Cherry Juice,	1 pint
Elixir Calisaya,	5 pints
Syrup,	1 pint
Water, sufficient to make	1 gallon

Mix and filter.

As thus prepared this very much resembles a popular proprietary elixir known as "Wheeler's Elixir." If the red cherry juice is not at hand, raspberry juice may be used in place of it, or elixir may be used and the preparation colored red and flavored with a little essence bitter almond. $\frac{1}{2}$ ounce lactic acid may be added if desired, which makes the composition still more like "Wheeler's."

Elixir Calisaya with "Protoxide" of Iron.**Elixir Peruvian Bark with "Protoxide" of Iron.**

Solution "Protoxide" of Iron,	6 fl.ounces
Elixir Calisaya,	5 pints
Syrup,	1 pint
Water, sufficient to make	1 gallon

Mix, color with caramel coloring, and filter.

The dose is a dessertspoonful to a tablespoonful.

Elixir Calisaya with Tincture Iron Chloride.

Potassium Citrate,	$\frac{1}{2}$ ounce av.
Tincture Ferric Chloride,	320 minims
Elixir Calisaya,	15 fl.ounces

Dissolve the salt in the elixir and add the tincture of iron; filter.

A fl.drachm contains about 6 drops tincture of ferric chloride, combined with elixir calisaya. The dose is a teaspoonful or more.

Elixir Calisaya Alkaloids with Tincture Iron Chloride.

Tincture Iron Citro-chloride,	320 minims
Quinine Sulphate or Muriate,	7 grains
Cinchonidine Sulphate,	12 grains
Elixir, sufficient to make	16 fl.ounces
Coloring, as desired.	

Rub the salts with the elixir and add the tincture iron citro-chloride; color with a little caramel coloring if desired.

A fl.drachm represents the equivalent of 6 drops tincture of iron in combination with calisaya alkaloids. Dose, a teaspoonful to a dessertspoonful.

Other Calisaya Compounds.

The foregoing compounds of elixir calisaya with other substances are those chiefly used, but a great variety of other combinations may be made, and some are called for occasionally. From the data given, they may be prepared without difficulty by druggists without special formulas.

Elixir Camphor, Mono-bromated.

Mono-bromated Camphor,	128 grains
Alcohol,	1 fl.ounce
Elixir,	15 fl.ounces

Dissolve the mono-bromated camphor in the alcohol by heat of a water-bath, and add the elixir gradually to the solution.

A fl.drachm contains 1 grain of the salt.

The dose is from 1 to 4 teaspoonfuls.

Elixir Cascara Sagrada. Cascara Cordial.

Cascara Sagrada Bark,	16 ounces av.
Licorice Root,	6 ounces av.
Sweet Flag Root (Calamus),	2 ounces av.
Cardamom Seed,	1 ounce av.
Sodium Bicarbonate,	1½ ounces av.
Elixir Percolating Menstruum, q. s., about	7 pints
Sugar,	2½ pounds
Soluble Flavoring,	8 fl.ounces

Reduce the drugs to a coarse powder, dissolve the potassium bicarbonate in 5 pints of the percolating menstruum and percolate the drugs first with this, and then with sufficient percolating menstruum, until 6 pints of percolate are obtained. In this dissolve the sugar and add the prepared flavoring, and enough percolating menstruum to make the measure one gallon.

The dose is from a dessertspoonful to a tablespoonful or more.

Buckthorn bark is frequently substituted for cascara in making this elixir on account of the bitter taste of the cascara; but the sodium bicarbonate overcomes that in a large degree. (See the Standard Remedies and Cascara Cordial).

Elixir Cascara Sagrada. (Aromatic). Cascara Cordial.

Elixir Rhamnus Purshiana.

The following formula is based upon the composition of P. D. & Co's. "Cascara Cordial," and makes a preparation almost identical with it:

Cascara Sagrada Bark, in coarse powder,	14½ ounces av.
Licorice Root, in coarse powder,	1½ ounces av.
Coriander Seed, in fine powder,	2 ounces av.
Ammonia Water,	1½ fl.ounces
Anise Oil,	7 minims
Orange Oil,	4 minims
Cassia Oil,	4 minims
Sugar,	2½ pounds
Diluted Alcohol,	3 pints
Water, sufficient to make	1 gallon

Macerate the cascara bark and licorice root with 2 pints of water to which the ammonia water has been added, for 12 hours, then heat to boiling, adding boiling water 2 pints, and continue the heat for half an hour; then strain, adding through the strainer enough boiling water to make 4 pints of the decoction. Strain or filter this and dissolve the sugar in the liquid. Dissolve the oils in ½ ounce of alcohol and add to the tincture, then add the tincture to the syrup, dissolve the sugar in the liquid and mix them well together. The dose is a teaspoonful or more as required.

Elixir Cascara Sagrada. (Tasteless). Cascara Cordial.

Cascara Sagrada Bark,	16 ounces av.
Licorice Root,	6 ounces av.
Sweet Flag Root,	2 ounces av.
Cardamom Seed,	1 ounce av.
Angelica Root,	1 ounce av.
Sodium Bicarbonate,	1 ounce av.
Diluted Alcohol,	3 pints
Sugar,	2 pounds
Water,	1 gallon

Grind the drugs to a coarse powder, moisten them with 2 pints diluted alcohol in which the sodium bicarbonate is dissolved, and macerate in a covered vessel for 24 hours; then transfer to a water-bath percolator, pack moderately, pour upon it the remaining 1 pint of men-

struum and set in a warm place for 24 hours; then heat moderately and after 1 hour begin to percolate, adding water to the drugs after the liquid has disappeared from the surface and continuing the heat and percolation until 7 pints have passed. In the percolate dissolve the sugar to make 1 gallon of the cordial. Ammonia water, 1½ ounces, may be used instead of the sodium bicarbonate, but in that case the percolate must be heated sufficiently to evaporate any excess of ammonia before adding the sugar. This preparation has been very popular as a laxative in habitual constipation, particularly of women and men of sedentary habits.

The so-called tasteless elixir of cascara may be made by mixing

Fluidextract Cascara, tasteless,	4 fl.ounces
Elixir,	12 fl.ounces

A fl.drachm represents about 15 grains of cascara sagrada.

Elixir Cathartic.

Many preparations are prescribed and sold under the above title, and as the name does not indicate any particular composition, the formulas for two of the most popular cathartic elixirs are given in this connection. Several others which have become popular as proprietary preparations will be found in that department, or among the Standard Remedies, and still others which are frequently called for as cathartic elixirs under other headings, as Elixir Laxative, Elixir Mandrake Compound, Elixir Senna Compound, the Elixirs of Rhubarb etc., etc.

Senna,	2 ounces av.
Licorice Root,	1 ounce av.
Epsom Salt,	1 ounce av.
Coriander,	80 grains
Ginger,	48 grains
Jalap,	160 grains
Scammony,	160 grains
Elixir Percolating Menstruum, q. s., or	1 pint
Sugar,	5 ounces av.
Soluble Flavoring,	1 fl.ounce

Reduce the drugs to a coarse powder, and make an elixir by percolation, as directed, then dissolve the epsom salt in the product.

The dose is a dessertspoonful to a tablespoonful.

Elixir Cathartic Compound. Cathartic or Laxative Elixir.

Since the introduction of cascara bark it has become a favorite ingredient of cathartic or laxative elixirs or cordials because of its prolonged effect. The following formula is therefore submitted:

Senna, bruised,	4 fl.ounces av.
Cascara Sagrada, in coarse powder,	8 fl.ounces av.

Butternut Bark, in coarse powder,	4	ounces av.
Leptandra Root, in coarse powder,	4	ounces av.
Sugar,	2½	pounds
Sodium Bicarbonate,	1	ounce av.
Sodium and Potassium Tartrate,	4	ounces av.
Prepared Flavoring,	8	fl.ounces
Alcohol,	20	fl.ounces
Water, sufficient to make	1	gallon

Mix the powdered drugs with the sodium bicarbonate and pour 3 pints of boiling water upon the mixture. Let stand in a warm place for 12 hours, then pour off the liquid and reserve. Add 3 pints more of boiling water to the drugs and set in a warm place as before for 6 hours, then pour off and reserve the liquid. Again add 2 pints of boiling water to the drugs, let stand 6 hours, pour off the liquid, and add to the reserved portions. Strain the liquid and dissolve in it the sugar and the Rochelle salts, then add the alcohol and prepared flavoring and enough water to make the measure 1 gallon. The dose is a teaspoonful to a dessertspoonful as a laxative, and a wineglassful as a cathartic.

Cathartic or Laxative Elixir.

Senna, in coarse powder,	2	ounces av.
* Butternut Bark, in coarse powder,	1	ounce av.
Mandrake Root, in coarse powder,	½	ounce av.
Sweet Flag, in coarse powder,	½	ounce av.
Rochelle Salts,	2	ounces av.
Elixir Percolating Menstruum, q. s., or	1	pint
Sugar,	5	ounces av.
Soluble Elixir Flavoring,	1	fl.ounce

Make by percolation as directed, and dissolve the salts in the elixir. The dose is a teaspoonful to a dessertspoonful or more.

Elixir Celery Compound.

This is also called "Elixir of Celery and Black Haw Compound," and "Elixir of Celery and Coca Compound."

Celery Seed, in fine powder,	1	ounce av.
Coca Leaves, in coarse powder,	1	ounce av.
Black Haw, in coarse powder,	1	ounce av.
Elixir Percolating Menstruum, q. s., or	1	pint
Sugar,	5	ounces av.
Soluble Elixir Flavoring,	1	fl.ounce

Make by percolation as directed.

A fl.drachm represents about 10 grains of the drugs. The dose is 1 to 2 teaspoonfuls.

Compound Elixir of Celery.

The National Formulary gives under the title "Elixir Apii Graveolentis Compositum," the following:

Fluidextract of Celery Root,	1 fl.ounce
Fluidextract of Erythroxylon,	1 fl.ounce
Fluidextract of Kola,	1 fl.ounce
Fluidextract of Virburnum Prunifolium,	1 fl.ounce
Alcohol,	2 fl.ounces
Aromatic Elixir, enough to make	16 fl.ounces

Mix the alcohol with 4 fl.ounces of aromatic elixir. To this add the fl.extract of celery root in several portions (shaking after each addition) and afterwards the other fluidextracts. Finally, add enough aromatic elixir to make 16 fl.ounces. Allow the mixture to stand 24 hours and filter.

Elixir Celery and Guarana.

This is made by mixing 2 fl.ounces of fluidextract of celery and 2 fl.ounces of fluidextract of guarana, with 12 ounces of elixir.

Elixir Chloral. Elixir Hydrated Chloral.

Hydrated Chloral crystals,	640 grains
Elixir, sufficient to make	1 pint

Dissolve the hydrated chloral in the elixir.

A fl.drachm contains 5 grains of hydrated chloral. The dose is from a teaspoonful to a tablespoonful.

Elixir Butyl Chloral, or Croton Chloral may be made in the same way and in the same proportion.

ELIXIRS CHLORIDES.

Under various titles indicating combination of chlorides in the form of elixirs, preparations have been introduced to the medical profession by manufacturing pharmacists. The most popular of these is the elixir of three chlorides, prepared by a Louisville firm; but following it elixirs of one, two, four, five and six chlorides have been introduced. The following formulas represent the most desirable chlorides prepared in the form of elixirs:

Elixir of One Chloride.

Under this title elixir mercuric chloride or corrosive sublimate containing $\frac{1}{8}$ grain of the salt in a fl.drachm may be dispensed.

Elixir of Two Chlorides.

Under this title elixir chloride of iron and arsenic representing 6 drops, tasteless tincture of iron and about $\frac{1}{50}$ grain of arsenic chloride in a fl.drachm may properly be dispensed.

Elixir Three Chlorides.

This is the most popular of the chloride elixirs. The formula given corresponds closely to the published composition of the proprietary articles.

Tasteless Tincture of Iron Chloride,	2	fl.drachms
Mercuric Chloride,	1	grain
Arsenic Chloride,	$\frac{1}{2}$	grain
Hydrochloric Acid,	1	fl.drachm
Quinine Sulphate,	3	grains
Cinchonidine Sulphate,	5	grains
Syrup,	4	fl.ounces
Elixir,	12	fl.ounces

Rub the arsenic chloride with a little elixir in a mortar and add the hydrochloric acid; add the other chlorides and rub with elixir until dissolved; then add the quinine and cinchonidine and syrup and filter.

Elixir Four Chlorides.

The following is the official formula of the American hospitals:

Mercuric Chloride,	$1\frac{1}{2}$	grains
Solution Arsenic Chloride,	4	fl.drachms
Tincture Iron Chloride,	$1\frac{1}{2}$	fl.ounces
Hydrochloric Acid, diluted,	1	fl.ounce
Syrup of Ginger,	3	fl.ounces
Distilled Water, (or elixir) ,	12	fl.ounces

Mix the liquids and dissolve the mercuric chloride by rubbing in a mortar with the mixture. Dose is a teaspoonful to a dessertspoonful well diluted with water 3 times a day. It should not be continued longer than two weeks at a time.

Elixir Five Chlorides.

Mercuric Chloride,	$1\frac{1}{2}$	grains
Solution Arsenic Chloride,	4	fl.drachms
Diluted Hydrochloric Acid,	1	fl.ounce
Tincture Iron Chloride,	$1\frac{1}{2}$	fl.ounces
Ammonium Chloride,	1	ounce av.
Syrup,	5	fl.ounces
Elixir,	8	fl.ounces

Mix the liquids and dissolve the mercuric chloride and ammonium chloride by rubbing them in a mortar with the mixture. Dose a teaspoonful to a dessertspoonful.

Elixir Six Chlorides.

Gold and Sodium Chloride,	10	grains
Elixir of Five Chlorides,	1	pint

Rub the salt with the elixir in a mortar until dissolved. Dose, a teaspoonful to a dessertspoonful.

Elixir Chloroform.

Chloroform,	128 minims
Alcohol,	1½ fl.ounces
Elixir, sufficient to make	1 pint

A fl.drachm contains one minim of chloroform, making a very convenient way of regulating the dose, which is from a teaspoonful to a tablespoonful.

Elixir Cinchonidine. Elixir Cinchonidia.

Cinchonidine Sulphate,	128 grains
Elixir,	1 pint

Dissolve the salt by rubbing in a mortar with separate portions of the elixir. In cold weather it may be necessary to warm the elixir in order to effect the solution.

A fl.drachm contains one grain of the salt. The dose is from a teaspoonful to a tablespoonful.

Elixir Cinchonidine and Iron.

Iron and Ammonium Citrate,	128 grains
Elixir Cinchonidine,	1 pint

Dissolve the iron by rubbing with the elixir. This makes a dark, wine-colored elixir. If the light-greenish color is desired use soluble iron phosphate instead of the citrate, dissolving it in a little hot water.

A fl.drachm contains 1 grain cinchonidine sulphate and 1 grain of the iron salt. The dose is a teaspoonful or more.

Elixir Cinchonidine, Iron and Arsenic.

Solution Arsenic Chloride,	640 minims
Elixir Cinchonidine and Iron,	1 pint

Mix them.

A fl.drachm contains nearly a grain each of cinchonidine and iron, and about $\frac{1}{50}$ grain arsenic.

Elixir Cinchonidine, Iron and Strychnine.

Strychnine Sulphate,	1¼ grains
Soluble Iron Phosphate,	128 grains
Cinchonidine Sulphate,	128 grains
Water,	1 fl.ounce
Elixir,	15 fl.ounces

Dissolve the strychnine salt in the water by the aid of heat; then add the iron salt, and when dissolved, add the solution to the elixir in which the cinchonidine has previously been dissolved.

A fl.drachm contains 1 grain each of iron and cinchonidine and $\frac{1}{100}$ grain strychnine sulphate. The dose is a teaspoonful or two.

An elixir similar to this was formerly much used as a substitute for elixir iron phosphate, quinine and strychnine, but as quinine is now so cheap, its use has greatly decreased.

Elixir of Caffeine Citrate.

Caffeine Citrate,	64 grains
Elixir,	1 pint

Dissolve the salt in the elixir. This may also be made double the strength of caffeine citrate if desired.

A fl.drachm made as above contains $\frac{1}{2}$ grain of the caffeine salt. The dose is a teaspoonful to a dessertspoonful.

Elixir Calumba.

Calumba, in coarse powder,	2 ounces av.
Elixir Percolating Menstruum,	1 pint
Sugar,	5 ounces av.
Soluble Flavoring,	1 fl.ounce

Make by percolation, or it may be made by rubbing 2 ounces of fluidextract of calumba with 2 drachms of magnesium carbonate, and 1 pint of elixir, and flavoring.

A fl.drachm represents 7 grains of calumba.

The dose is a teaspoonful or more.

Elixir Coca. Elixir Erythroxyton.

A formula for this elixir is given under the latter title in this work, but it is generally known by the former title, the official name of the drug being changed to **coca** in the 1890 U. S. P.

Fluidextract Coca,	2 $\frac{5}{8}$ fl.ounces
Elixir,	13 $\frac{3}{8}$ fl.ounces

Mix them. By adding $\frac{1}{4}$ ounce of precipitated calcium phosphate and allowing to stand 24 hours, with frequent agitation, before filtering, this makes a clear preparation which otherwise is slightly turbid. The dose is from 1 to 2 fl.drachms or more if required. The formula of the National Formulary directs 2 ounces of fluidextract of coca in 16 ounces. Some manufacturers claim to represent 120 grains of the drug in a fluidounce.

Elixir Coca and Calisaya.

Elixir Coca,	8 fl.ounces
Elixir Calisaya,	8 fl.ounces

Mix them. A fl.drachm represents 5 grains coca and about 2 grains calisaya. The dose is a teaspoonful to a tablespoonful.

Elixir Coca and Calisaya Ferriphosphated.

Soluble Iron Phosphate,	125 grains
Hot Water,	1 fl.ounce
Elixir Coca and Calisaya,	15 fl.ounces

Dissolve the iron salt in the hot water and add to the elixir.

A fl.drachm represents about 5 grains coca, 2 grains calisaya and 1 grain iron phosphate. Dose, a teaspoonful to a dessertspoonful.

Elixir Coca and Guarana.

Fluidextract of Coca,	2 fl.ounces
Fluidextract of Guarana,	2 fl.ounces
Elixir,	12 fl.ounces

Mix them and after standing, filter. A fl.drachm represents $7\frac{3}{8}$ grains each of coca and guarana. The dose is a teaspoonful to a dessertspoonful.

Elixir Cocaine.

Cocaine Hydrochloride,	32 grains
Elixir,	1 pint

Dissolve the salts in the elixir.

A fl.drachm contains $\frac{1}{4}$ grain cocaine hydrochloride.

The dose is from 1 to 2 teaspoonfuls, as an anodyne and hypnotic.

Cocaine hydrochloride may be combined with many other elixirs and will be found advantageous in all sedative and anodyne combinations.

Elixir Coffee.

Roasted Java Coffee,	4 ounces av.
Elixir Percolating Menstruum, q. s., or	1 pint
Sugar,	5 ounces av.
Soluble Elixir Flavoring,	1 fl.ounce

Make by percolation as directed.

A fl.drachm represents about 15 grains of coffee.

The dose is a teaspoonful to a tablespoonful or more.

This elixir is used mainly to mask the taste of disagreeable medicine, and may be combined to advantage with many bitter salts, fluidextracts etc.

Elixir Conium and Iron.

Fluidextract of Conium,	1 fl.ounce
Elixir Pyrophosphate of Iron,	15 fl.ounces
Mix and, after standing, filter.	

A fl.drachm contains about $3\frac{1}{2}$ grains of conium and 2 grains iron pyrophosphate. The dose is a teaspoonful or more.

Elixir Corrosive Sublimate. Elixir Mercury Bichloride.

It is sometimes desirable to have a preparation of mercury bichloride for internal use, and it is best exhibited for this purpose in the form of an elixir, which may be made as follows:

Mercury Bichloride,	16 grains
Elixir,	1 pint

Rub the salt with separate portions of the elixir until dissolved.

A fl.drachm contains $\frac{1}{8}$ grain corrosive sublimate.

The dose is $\frac{1}{2}$ to 1 teaspoonful.

This is a very convenient way of preparing a solution of mercury bichloride for internal use, as the dose can be easily regulated, and the metallic taste is well disguised.

Elixir Corydalis.

Corydalis, in coarse powder,	2 ounces av.
Elixir Percolating Menstruum, q. s., or	1 pint
Sugar,	5 ounces av.
Soluble Elixir Flavoring,	1 fl.ounce

Make by percolation. It may also be made by mixing 2 ounces of the fluidextract of corydalis with 14 ounces of elixir.

A fl.drachm represents about $7\frac{1}{2}$ grains of the drug.

The dose is a teaspoonful or more.

Elixir Corydalis Compound.

Corydalis, Yellow Dock, Tag Alder,	
Figwort, Mandrake, of each,	1 ounce av.
Elixir Percolating Menstruum, q. s., about	20 fl.ounces
Sugar,	5 ounces av.
Soluble Elixir Flavoring,	1 fl.ounce

Make by percolation as directed.

The dose is a teaspoonful or more as an alterative or diuretic.

Elixir Damiana.

Damiana Leaves,	1280 grains
Elixir Percolating Menstruum, q. s., about	1 pint
Sugar,	5 ounces av.
Soluble Elixir Flavoring,	1 fl.ounce

Make by percolation as directed, or it may be made by mixing $2\frac{5}{8}$ fl.ounces of fluidextract of damiana with $13\frac{3}{8}$ fl.ounces of elixir, and filtering.

A fl.drachm represents 10 grains of damiana. The dose is from 1 to 4 teaspoonfuls as a diuretic and aphrodisiac.

Elixir Damiana Compound.

Fluidextract of Buchu,	1 fl.ounce
Fluidextract of Nux Vomica,	2 fl.drachms
Fluidextract of Cubebs,	2 fl.drachms
Fluidextract of Damiana,	1 fl.ounce
Magnesium Carbonate,	60 grains
Elixir,	15 fl.ounces

Mix the fluidextracts and rub with magnesium carbonate; then add the elixir and filter. The dose is a teaspoonful or two as a diuretic etc.

Elixir Damiana, Iron and Phosphorus.

Spirit of Phosphorus, U. S. 1890 Pharm.,	1 fl.ounce
Pyrophosphate of Iron,	128 grains

Fluidextract of Damiana,	2 fl.ounces
Magnesium Carbonate,	60 grains
Elixir, sufficient to make	16 fl.ounces

Rub the magnesium carbonate with the fluidextract, add 14 ounces of elixir, and filter. Dissolve the iron salt in 1 ounce of hot water and add to the filtered liquid, then add the spirit of phosphorus and enough elixir to make the measure 16 fl.ounces. Dose, a teaspoonful as an aphrodisiac.

Elixir Damiana, Nux Vomica, Iron and Phosphorus.

Fluidextract Nux Vomica,	128 minims
Elixir Damiana, Iron and Phosphorus,	16 fl.ounces

Mix them. The dose is a teaspoonful.

Elixir Damiana, Phosphorus and Nux Vomica.

Fluidextract of Nux Vomica,	128 minims
Fluidextract of Damiana,	2 fl.ounces
Spirit of Phosphorus,	1 fl.ounce
Magnesium Carbonate,	60 grains
Elixir, sufficient to make	16 fl.ounces

Rub the fluidextracts with the magnesium carbonate and 14 ounces of elixir and filter. Add the spirit of phosphorus to the filtered liquid and enough elixir to make 16 fl.ounces. Dose, a teaspoonful.

Elixir Dandelion. Elixir of Taraxacum.

Fluidextract of Dandelion,	25 $\frac{3}{8}$ fl.ounces
Elixir,	13 $\frac{3}{8}$ fl.ounces

Mix them. A fl.drachm represents 10 grains dandelion root.

The dose is from a teaspoonful to a tablespoonful or more, as a laxative and tonic.

Elixir Dandelion Compound. Elixir Taraxacum Compound.

Dandelion Root, in coarse powder,	16 ounces av.
Licorice Root,	8 ounces av.
Gentian Root,	1 ounce av.
Wild Cherry Bark,	2 ounces av.
Bitter Orange Peel,	2 ounces av.
Canada Snake Root,	$\frac{1}{2}$ ounce av.
Cloves, in fine powder,	$\frac{1}{4}$ ounce av.
Cinnamon, in fine powder,	1 ounce av.
Coriander, in fine powder,	1 ounce av.
Cardamom, in fine powder,	$\frac{1}{4}$ ounce av.
Elixir Percolating Menstruum, q. s., about	1 gallon
Sugar,	2 $\frac{1}{2}$ pounds

To make 1 gallon of the elixir.

Make by percolation as directed.

This elixir is variously prepared by different authorities, but it amounts to about the same as made by any of the standard formulas. It is used chiefly as a vehicle for unpleasant medicines, and to mask the taste of quinine. It is also given as a mild tonic and laxative in doses of a dessertspoonful or more. It has been a very popular elixir. The New York and Brooklyn Formulary makes elixir taraxacum compound very sweet with syrup.

Elixir Digitalis

Fluidextract of Digitalis,	256 minims
Elixir, sufficient to make	1 pint

Mix them. A fl.drachm contains 2 minims fluidextract digitalis. The dose is a teaspoonful to a tablespoonful.

Elixir Ergot.

Fluidextract of Ergot,	2½ fl.ounces
Elixir,	14 fl.ounces

Mix them. This is the same strength as wine of ergot, and is much to be preferred to it. It may also be made by percolation from freshly powdered ergot, but is probably fully as reliable made from a good fluidextract. The dose is a teaspoonful or more.

Elixir Erythroxyton. Elixir of Coca.

Coca Leaves, in coarse powder,	1280 grains
Elixir Percolating Menstruum, q. s., about	1 pint
Sugar,	5 ounces av.
Soluble Elixir Flavoring,	1 fl.ounce

Make by percolation as directed. It may also be made by mixing 25⅞ fl.ounces of fluidextract erythroxyton with 13⅜ fl.ounces of elixir. A fl.drachm represents 10 grains erythroxyton or coca. The dose is 1 to 2 fl.drachms or more, as a nerve tonic etc.

Elixir Eucalyptus.

Eucalyptus Leaves, in coarse powder,	1280 grains
Alcohol,	2 fl.ounces
Elixir Percolating Menstruum, q. s., about	14 fl.ounces
Sugar,	5 ounces av.
Soluble Elixir Flavoring,	1 fl.ounce

Make by percolation as directed. It may also be made by mixing 25⅞ fl.ounces of fluidextract eucalyptus with 2 fl.ounces of alcohol and 11⅜ fl.ounces of elixir. A fl.drachm represents 10 grains eucalyptus. The dose is a teaspoonful or more, as an aromatic stimulant.

Elixir Eucalyptus Compound.

Eucalyptus Leaves, in coarse powder,	1 ounces av.
Licorice Root, in coarse powder,	1 ounce av.

Wild Cherry Bark, in coarse powder,	1 ounce av.
Elixir Percolating Menstruum, q. s., about	18 fl.ounces
Sugar,	5 ounces av.
Soluble Elixir Flavoring,	1 fl.ounce

Make by percolation as directed. It may also be made from the fluidextracts of eucalyptus 2 ounces; licorice and wild cherry, of each, 1 ounce; mixed with 12 ounces of elixir and filtered through a little magnesium carbonate.

This elixir is used mainly as a vehicle for quinine and other bitter medicines. Its astringent properties render the quinine insoluble and therefore tasteless.

Elixir Euonymus. Elixir of Wahoo.

Fluidextract of Wahoo,	2 fl.ounces
Fluidextract of Licorice,	½ fl.ounce
Elixir,	13½ fl.ounces

Mix, and after standing, filter. This may be also made by percolating 2 ounces av. of wahoo and ½ ounce licorice root in coarse powder with elixir percolating menstruum 1 pint, and adding sugar 5 ounces av., and soluble flavoring 1 fl.ounce, as directed.

A fl.drachm represents about 7 grains of wahoo. The dose is a teaspoonful or more, as a bitter tonic and laxative.

The New York and Brooklyn Formulary directs fluidextract euonymus 2½ fl.ounces, syrup of coffee 2 fl.ounces, water 2 fl.ounces, compound tincture of taraxacum q. s. to make 16 fl.ounces.

ELIXIR FERRI, QUININÆ ET STRYCHNINÆ PHOSPHATUM. U. S.

Elixir of the Phosphates of Iron, Quinine and Strychnine.

This is the only medicinal elixir in the U. S. P. The formula is:

Soluble Ferric Phosphate,	17.500 Gm. or 270 grains
Quinine,	7.750 Gm. or 135 grains
Strychnine,	0.275 Gm. or 4¼ grains
Phosphoric Acid,	2.000 Gm. or 31 grains
Ammonium Carbonate,	9.000 Gm. or 139 grains
Alcohol,	60.000 Cc. or 2 fl.oz.+14 min.
Acetic Acid,	28.500 Cc. or 464 minims
Distilled Water,	

Aromatic Elixir, each, a sufficient quantity

To make 1000 Cc. or 33 fl.oz.+390 min.

The quinine (alkaloid) and strychnine (alkaloid) are to be dissolved in the alcohol, then the phosphoric acid and 350 Cc. (or 11 fl.ounces+400 minims) of aromatic elixir added to the solution. Add the acetic acid to the ammonium carbonate, (translucent pieces), con-

tained in a suitable vessel, and when the solution is completed neutralize with ammonia water and add enough distilled water to make the product measure 50 Cc. (or 1 fl.ounce+331 minims). Mix the solution of ammonium acetate (thus prepared) with the solution of alkaloids, and add enough aromatic elixir to make the liquid measure 880 Cc. (or 29 fl.ounces+365 minims). Dissolve the soluble ferric phosphate in 30 Cc. (or 1 fl.ounce) of distilled water, by the aid of gentle heat, and if the solution be acid to litmus paper, neutralize exactly with ammonia water and add enough aromatic elixir to make the product measure 120 Cc. (or 4 fl.ounces+28 minims). Finally, mix the two solutions and filter if necessary.

Average dose.—4 Cc. (1 fl.drachm).

A fl.drachm, which is the usual dose, represents about $\frac{1}{64}$ grain strychnine and $\frac{1}{2}$ grain quinine, combined with iron phosphate 1 grain. See also Elixir Iron Phosphate, Quinine and Strychnine.

Elixir Frangula. Elixir Buckthorn.

The New York and Brooklyn Formulary gives the following formula under this title. It should not be mistaken for the proprietary preparation known as Buckthorn Cordial, which will be found among the Standard Remedies.

Fluidextract of Frangula (Buckthorn),	4 fl.ounces
Compound Elixir of Taraxacum,	4 fl.ounces
Simple Elixir,	8 fl.ounces

Mix them. A fl.drachm represents 15 grains frangula. The dose is a dessertspoonful or more.

Elixir Gelsemium. Elixir Yellow Jasmine.

Fluidextract Gelsemium,	640 minims
Alcohol,	2 fl.ounces
Elixir, sufficient to make	1 pint

Mix, and after standing, filter. A fl.drachm represents 5 grains gelsemium. The dose is from $\frac{1}{2}$ to a teaspoonful.

Elixir Gentian.

Gentian Root, in coarse powder,	2½ ounces av.
Bitter Orange Peel, in coarse powder,	1½ ounces av.
Coriander Seed, in fine powder,	1 ounce av.
Elixir Percolating Menstruum, q. s., about	7½ pints
Sugar,	2½ pounds
Soluble Elixir Flavoring,	8 fl.ounces

To make 1 gallon of elixir.

Make by percolation as directed. Add the white of 1 egg, shake, allow to stand two or three days, heat to 190°F., cool, and filter clear.

This is the same strength as the old official compound infusion of gentian. The white of egg is added for the purpose of removing any astringent principles, so that the elixir may be mixed with solutions of iron. It is the base of all the gentian elixirs, which may be made from it by adding various salts, solutions etc.

The dose of the simple elixir of gentian as a stomachic is a teaspoonful to a tablespoonful.

The New York and Brooklyn Formulary directs

Extract of Gentian,	70 grains
Aromatic spirit,	3 fl.drachms
Tincture of Vanilla,	3 fl.drachms
Syrup,	1 fl.ounce
Simple Elixir,	16 fl.ounces

Dissolve the extract in the syrup by trituration. Add the vanilla and elixir. The National Formulary formula is the same except that the extract gentian is dissolved in a portion of the elixir and the other ingredients added to the solution.

Elixir Gentian and Bismuth.

Bismuth and Ammonium Citrate,	128 grains
Elixir Gentian,	1 pint

Dissolve the bismuth salt in a little water by the aid of a few drops of ammonia water, and add to the elixir, and filter.

A fl.drachm contains 1 grain of bismuth salt combined with elixir gentian. The dose is a teaspoonful or two—an excellent stomachic.

Elixir of Gentian and Iron Chloride.

The elixir of gentian with tincture iron chloride is still the favorite, and no better formula has been devised than the following:

Tincture Iron Citro-chloride,	300 minims
Elixir Gentian, enough to make	16 fl.ounces

Mix them. If 2 ounces of syrup are used in place of 2 ounces of elixir, the preparation is somewhat improved in taste.

Elixir Gentian, Iron and Bismuth.

Bismuth and Ammonium Citrate,	128 grains
Elixir Gentian and Iron Citrate,	1 pint

Dissolve the bismuth salt in a little water by the aid of a few drops of ammonia water, and add to the elixir gentian and iron citrate.

A fl.drachm contains 1 grain each iron and bismuth combined with elixir of gentian. The dose is a teaspoonful or two.

Elixir Gentian, Iron, Bismuth and Strychnine.

Strychnine Sulphate,	1¼ grains
Elixir Gentian and Iron Phosphate,	1 pint

Dissolve the strychnine salt by rubbing with separate portions of the elixir, or add an equivalent quantity of solution of strychnine, and

filter. A fl.drachm contains 1 grain each iron and bismuth, and $\frac{1}{100}$ grain strychnine sulphate, combined with elixir gentian.

The dose is a teaspoonful or two.

Elixir Gentian and Iron Chloride with Quinine.

Quinine Sulphate,	128 grains
Elixir Gentian and Iron Tincture,	1 pint

Dissolve the quinine salt in the elixir. A fl.drachm contains 1 grain quinine sulphate combined with elixir gentian and iron chloride.

The dose is a teaspoonful to a dessertspoonful.

Elixir Gentian, Iron Chloride, Quinine and Strychnine.

Strychnine Sulphate,	$1\frac{1}{4}$ grains
Quinine Sulphate,	128 grains
Elixir Gentian and Iron Chloride,	1 pint

Rub the strychnine salt first with separate portions of the elixir to dissolve, then add the quinine salt.

A fl.drachm contains 1 grain quinine sulphate, $\frac{1}{100}$ grain strychnine sulphate combined with elixir gentian and iron chloride. The dose is a teaspoonful or two.

Elixir Gentian and Iron Citrate. Ferrated Elixir of Gentian.

Iron and Ammonium Citrate,	128 grains
Elixir Gentian,	1 pint

Dissolve the iron salt by rubbing with separate portions of the elixir, and filter. A fl.drachm contains 1 grain of iron citrate combined with elixir gentian. The dose is a teaspoonful or two.

Elixir Gentian and Iron Phosphate.

Soluble Iron Phosphate,	128 grains
Water,	1 fl.ounce
Elixir Gentian,	15 fl.ounces

Dissolve the iron salt in the water by the aid of heat, add the elixir, and filter. A fl.drachm contains 1 grain iron phosphate combined with elixir of gentian. The dose is a teaspoonful.

Elixir Gentian, Iron Phosphate and Strychnine.

Ferri-phosphated Elixir of Gentian with Strychnine.

Strychnine Sulphate,	$1\frac{1}{4}$ grains
Elixir Gentian, Iron and Bismuth,	1 pint

Dissolve the strychnine salt by rubbing with the elixir, or add an equivalent quantity of solution of strychnine. A fl.drachm contains 1 grain of iron phosphate and $\frac{1}{100}$ grain of strychnine sulphate combined with elixir of gentian. The dose is a teaspoonful or two.

Elixir Gentian and Iron Pyrophosphate.**Ferro-phosphated Elixir of Gentian.**

Iron Pyrophosphate,	128 grains
Water,	1 fl.ounce
Elixir Gentian,	15 fl.ounces

Dissolve the iron salt in the water by the aid of heat, add the elixir of gentian, and filter. A fl.drachm contains 1 grain iron pyrophosphate combined with elixir gentian. The dose is a teaspoonful or two.

Other combinations of gentian and iron pyrophosphate may be made by adding other ingredients.

Elixir Gentian, Iron and Strychnine.

Strychnine Sulphate,	1¼ grains
Elixir Gentian and Iron (made with either the Citrate, Phosphate, or Pyrophosphate of Iron),	1 pint

Dissolve the strychnine salt by rubbing with separate portions of the elixir, or add an equivalent quantity strychnine solution and filter.

A fl.drachm contains $\frac{1}{100}$ grain strychnine sulphate combined with elixir gentian and iron. The dose is a teaspoonful or two.

Elixir Gentian and Strychnine.

Strychnine Sulphate,	1¼ grains
Elixir Gentian,	1 pint

Dissolve the strychnine salt by rubbing with separate portions of the elixir, or add an equivalent quantity of strychnine solution, and filter. A fl.drachm contains $\frac{1}{100}$ grain of strychnine sulphate combined with elixir gentian. The dose is a teaspoonful or two.

Elixir Gentian, Strychnine and Bismuth.

Strychnine Sulphate,	1¼ grains
Elixir Gentian and Bismuth,	1 pint

Dissolve the strychnine salt by rubbing with separate portions of the elixir, or add an equivalent quantity of strychnine solution.

A fl.drachm contains 1 grain bismuth and $\frac{1}{100}$ grain strychnine sulphate combined with elixir gentian and bismuth. Dose, a teaspoonful.

Elixir Gentian with Tincture Iron Citro-chloride.

Solution Iron Chloride,	1½ fl.drachms
Sodium Carbonate,	200 grains
Citric Acid,	120 grains
Elixir Gentian, sufficient to make	1 pint

Rub the citric acid to a powder and dissolve it in the elixir of gentian, add to the solution the sodium carbonate in crystals and allow to stand until effervescence ceases and the sodium carbonate is dis-

solved; then add the solution of iron, and after standing a day or two, filter.

This may be made by using 6 drachms tincture iron chloride instead of the solution, as directed.

It may also be made by taking

Tasteless Tincture Iron Chloride,	320 minims
Elixir, sufficient to make	1 pint

Mix them.

In former editions of Fenner's Formulary the formula has been

Potassium or Sodium Citrate,	$\frac{1}{2}$ ounce av.
Tincture of Iron Chloride,	320 minims
Elixir Gentian, sufficient to make	1 pint

Mix and dissolve.

All these formulæ make practically the same preparation; the potassium or sodium citrate which is formed making with the solution of iron double salts,—citro-chloride of iron and sodium, or citro-chloride of iron and potassium—which have not the styptic taste of the iron salt.

A fl.drachm contains the equivalent of $2\frac{1}{2}$ minims (6 drops) of tincture of iron combined with elixir of gentian.

The dose is a teaspoonful to a dessertspoonful.

Elixir Gentian, Tincture Iron Citro-chloride with Lactopeptine.

Lactopeptine,	256 grains
Elixir Gentian and Iron Citro-chloride,	1 pint

Macerate the lactopeptine for 24 hours or longer, with occasional agitation, in the elixir gentian etc., and filter.

A fl.drachm contains 2 grains lactopeptine combined with elixir gentian and iron chloride.

Other combinations of lactopeptine with elixirs of gentian may be made in the same manner.

Elixir Ginger.

Soluble Extract of Ginger,	2 fl.ounces
Elixir,	14 fl.ounces

Mix them. A fl.drachm represents about 4 grains of ginger. The dose is a teaspoonful or more.

Elixir Gluside. B. P. C. 1901. Elixir of Saccharin.

Gluside (Saccharin),	480 grains
Sodium Bicarbonate,	240 grains
Alcohol, (90%),	$2\frac{1}{2}$ fl.ounces
Distilled Water, sufficient to make	20 fl.ounces

Rub the gluside and the sodium bicarbonate in a mortar with 10 fl.ounces of the distilled water, gradually added. When dissolved add the alcohol, filter, and wash with sufficient distilled water to produce

20 fl.ounces. A fl.drachm contains 3 grains of gluside. Dose, 5 to 20 minims. It may be used as a sweetening for medicines.

ELIXIRS GLYCERINOPHOSPHATES.

A number of glycerinophosphate elixirs have been recently introduced by manufacturing pharmacists. They are recommended as nerve tonics and reconstitutives and seem to be well adapted to the treatment of certain conditions resulting from deficient osseous nutrition and nervous anæmia. See Acidum Glycerinophosphatum and Glycerinophosphates.

Elixir Glycerinophosphates Compound.

Calcium Glycerinophosphate,	128 grains
Sodium Glycerinophosphate,	256 grains
Iron Glycerinophosphate,	24 grains
Manganese Glycerinophosphate,	16 grains
Quinine Glycerinophosphate,	8 grains
Strychnine Glycerinophosphate,	1 grain
Glycerinophosphoric Acid,	120 grains
Glycerin,	4 fl.ounces
Elixir, sufficient to make	1 pint

Mix the glycerin and acid with 10 ounces of elixir and dissolve the glycerinophosphates in the mixture, adding enough elixir to make the measure 1 pint.

A fl.drachm contains about $3\frac{1}{2}$ grains of the mixed glycerinophosphates. The dose is 1 or 2 teaspoonfuls.

All of these glycerinophosphate salts are now furnished by manufacturing chemists, also glycerinophosphoric acid; but in case all are not readily obtainable, soluble iron phosphate, manganese hypophosphite, and the sulphates of quinine and strychnine, instead of the glycerinophosphates, and phosphoric acid 90 grains, may be used instead of glycerinophosphoric acid. The calcium and sodium glycerinophosphates, being in much larger quantity, should be used.

Elixir Glycerinophosphites Lime and Soda.

Calcium Glycerinophosphate,	64 grains
Sodium Glycerinophosphate,	128 grains
Glycerinophosphoric Acid,	120 grains
Glycerin,	4 fl.ounces
Elixir,	12 fl.ounces

Mix the acid, glycerin and elixir and dissolve the glycerinophosphate salts in the mixture. A fl.drachm represents $1\frac{1}{2}$ grains of the glycerinophosphate salts. Dose a dessertspoonful to a tablespoonful.

Some manufacturers make this with double the quantity of the glycerinophosphate salts, and direct the dose from a teaspoonful to a

dessertspoonful. Phosphoric acid 90 grains may be used instead of glycerinophosphoric acid if this is not readily obtainable.

Elixir Grindelia Robusta.

Fluidextract Grindelia Robusta,	25⅞ fl.ounces
Alcohol,	2 fl.ounces
Elixir, sufficient to make	1 pint
Magnesium Carbonate,	2 drachms

Rub the magnesium carbonate to a fine powder, and then with the fluid extract and alcohol; then gradually add elixir and, after standing a day or two, filter.

A fl.drachm represents 10 grains of grindelia. The dose is a teaspoonful to a dessertspoonful.

Elixir Guarana.

Fluidextract of Guarana,	25⅞ fl.ounces
Elixir, sufficient to make	1 pint

Mix them. A fl.drachm represents 10 grains guarana. The dose is from a teaspoonful to a dessertspoonful or more.

The B. P. C. 1901 Formulary, directs:

Guarana, in No. 60 powder,	4 ounces av.
Light Magnesia, calcined,	½ ounce av.
Oil of Cinnamon,	6 minims
Syrup,	2 fl.ounces
Alcohol, (60%), sufficient to make	20 fl.ounces

Mix the guarana and magnesia intimately in a mortar and moisten them with 3 ounces of the alcohol. After 24 hours maceration, mix with 8 ounces of coarse sand, pack in a percolator; add proof spirit and percolate until 16 ounces are obtained, then transfer the mass to a press-bag and apply pressure. To the percolate add the syrup and oil of cinnamon, and make up to 20 fl.ounces by addition of the expressed liquid previously reduced by evaporation if necessary. This represents 20% of guarana. Dose, ½ to 2 fl.drachms.

Elixir Guarana and Celery.

Fluidextract Guarana,	2 fl.ounces
Fluidextract Celery,	2 fl.ounces
Elixir,	12 fl.ounces

Mix them and filter. A fl.drachm represents about 7 grains each of celery and guarana. The dose is a teaspoonful or more.

Elixir Helonias Compound.

Mitchella, (Partridge Berry or Squaw Vine),	2 ounces av.
Cramp Bark,	1 ounce av.
Blue Cohosh,	1 ounce av.
Unicorn Root, (Helonias),	1 ounce av.

Elixir Percolating Menstruum, q. s., about	20 fl.ounces
Sugar,	5 ounces av.
Soluble Elixir Flavoring,	1 fl.ounce

Make by percolation as directed. The dose is a teaspoonful or more, as a catholicon.

The advertising of "Aletris Cordial" during the past few years has made an increased demand for preparations of this kind. The old "Mother's Cordial" of the Eclectics was the mother of all this class of preparations. Elixir helonias compound may be readily made by mixing fluidextracts of helonias, cramp bark, blue cohosh, each, 1 fl.ounce; with fluidextract mitchella 4 fl.ounces and elixir enough to make a pint.

Elixir Heroin.

Heroin,	5 grains
Elixir,	1 pint

Rub the heroin in a mortar with the elixir until dissolved.

A fl.drachm contains $\frac{1}{25}$ grain heroin.

Elixir Heroin and Terpin Hydrate.

Heroin,	5 grains
Terpin Hydrate,	128 grains
Alcohol,	1 fl.ounce
Elixir,	15 fl.ounces

Heat the terpin hydrate with the alcohol in a closed 2 ounce bottle. Dissolve the heroin in the elixir, previously warmed, mix the solutions and filter. A fl.drachm contains $\frac{1}{25}$ grain heroin and 1 grain terpin hydrate. An elixir containing double the quantity of heroin combined with the same quantity of terpin hydrate may be prepared.

Elixir Heroin Compound.

Heroin,	$2\frac{2}{3}$ grains
Fluidextract of Ipecac,	22 minims
Chloroform,	32 grains
Elixir, sufficient to make	1 pint

Mix the liquids and dissolve the heroin in the mixture. A fl.drachm contains $\frac{1}{48}$ grain heroin, about $\frac{1}{5}$ grain ipecac and $\frac{1}{4}$ grain chloroform. Dose a teaspoonful to a dessertspoonful, for coughs and bronchial irritation.

Elixir Hops, or Humulus.

Hops, in coarse powder,	$2\frac{5}{8}$ ounces av.
Elixir Percolating Menstruum, q. s., about	18 fl.ounces
Sugar,	5 ounces av.
Soluble Elixir Flavoring,	1 fl.ounce

Make by percolation as directed.

This may also be made from fluidextract of hops 25/8 fl.ounces, elixir 14 fl.ounces, magnesium carbonate 1 drachm. Mix and filter.

A fl.drachm represents 10 grains of hops. The dose is a teaspoonful to a tablespoonful, as a nervine and tonic.

Elixir Hydrangea.

Fluidextract Hydrangea,	2 fl.ounces
Elixir,	14 fl.ounces

Mix them. A fl.drachm represents about 15 grains of hydrangea.

Elixir Hydrangea and Lithium.

Fluidextract Hydrangea,	1 1/3 fl.ounces
Lithium Benzoate,	256 grains
Lithium Salicylate,	256 grains
Elixir, sufficient to make	1 pint

Mix, dissolve and filter. A fl.drachm contains 5 grains hydrangea, 2 grains each lithium benzoate and salicylate.

Elixir Hydrangea and Lithium Compound.

Lithium Benzoate,	256 grains
Potassium Bicarbonate,	256 grains
Fluidextract Buchu,	128 minims
Fluidextract Hydrangea,	128 minims
Fluidextract Triticum,	128 minims
Fluidextract Saw Palmetto,	128 minims
Elixir, sufficient to make	1 pint

Mix, dissolve and filter. Dose a teaspoonful to a dessertspoonful.

Elixir Hydrastis or Golden Seal.

Fluidextract of Golden Seal, aqueous,	640 grains
Elixir, sufficient to make	1 pint

Mix and after standing, filter. This may also be made by percolating 640 grains powdered hydrastis with elixir sufficient to make a pint. A fl.drachm represents 5 grains golden seal. The dose is a teaspoonful to a dessertspoonful.

Elixir Hydrastis and Iron.

Soluble Iron Phosphate,	128 grains
Water,	1 fl.ounce
Elixir Hydrastis,	15 fl.ounces

Dissolve the iron salt in the water by the aid of heat, and add to the elixir. A fl.drachm contains 1 grain of the iron salt combined with elixir hydrastis. The dose is a teaspoonful or two.

Other salts of iron may be combined with elixir hydrastis in a similar manner.

Elixir Hydrastis, Iron and Bismuth.

Bismuth and Ammonium Citrate,	128 grains
Iron and Ammonium Citrate,	128 grains
Water,	1 f.ounce

Dissolve the bismuth salt in the water by the aid of a few drops of ammonia water, dissolve the iron salt in the elixir, and mix the solutions. A fl.drachm contains 1 grain each of the iron and bismuth salts combined with elixir hydrastis. The dose is a teaspoonful or two.

Elixir hydrastis and bismuth may be made the same as the above, only omitting the iron salt.

Elixir Hydrastis, Iron and Strychnine.

Strychnine Sulphate,	1¼ grains
Elixir Hydrastis and Iron,	1 pint

Dissolve the strychnine salt by rubbing with separate portions of the elixir, or add 1¼ fl.drachms solution of strychnine to a pint of the elixir. A fl.drachm contains $\frac{1}{100}$ grain strychnine sulphate and 1 grain iron, combined with elixir hydrastis. The dose is a teaspoonful.

Other combinations may readily be made by adding various salts, solutions or substances to elixir hydrastis, or by adding 1½ f.ounces of aqueous fluidextract hydrastis to a pint of other elixirs.

Elixir Hyoscyamus or Henbane.

Fluidextract of Hyoscyamus,	2¾ f.ounces
Elixir, sufficient to make	1 pint

Mix them. This may be made by percolating 1280 grains hyoscyamus with elixir percolating menstruum 1 pint, adding sugar 5 ounces, and soluble flavoring 1 ounce, as directed. A fl.drachm represents 10 grains hyoscyamus. The dose is a teaspoonful or more.

Elixir Hypophosphites Compound.

Calcium Hypophosphite,	256 grains
Sodium Hypophosphite,	64 grains
Potassium Hypophosphite,	64 grains
Elixir,	1 pint

Rub the hypophosphites to a fine powder, and with the elixir until dissolved. A fl.drachm contains 3½ grains of the hypophosphites.

The dose is a teaspoonful or two.

ELIXIRS IODIDES.

Several preparations combining iodides in the form of elixirs have been introduced. The following may be suggested as valuable combinations:

Elixir One Iodide.

The elixir iodide of potassium containing 5 grains of potassium iodide in a fl.drachm, dissolved in elixir.

Elixir Two Iodides.

Arsenic Iodide,	1 grain
Potassium Iodide,	640 grains
Elixir, sufficient to make	16 fl.ounces

Dissolve the salts by rubbing with the elixir in a mortar and filter. A fl.drachm contains $\frac{1}{128}$ grain arsenic iodide and 5 grains potassium iodide.

Elixir Three Iodides.

Arsenic Iodide,	1 grain
Iron Iodide,	10 grains
Potassium Iodide,	640 grains
Elixir, sufficient to make	16 fl.ounces

Dissolve the salts by rubbing with the elixir in a mortar, then filter. A fl.drachm contains $\frac{1}{128}$ grain arsenic iodide, 5 grains potassium iodide and about $\frac{1}{12}$ grain iron iodide.

Elixir Four Iodides.

Arsenic Iodide,	1 grain
Iron Iodide,	10 grains
Ammonium Iodide,	64 grains
Elixir, sufficient to make	16 fl.ounces

Dissolve the salts in the elixir by rubbing in a mortar and filter. A fl.drachm contains $\frac{1}{128}$ grain arsenic iodide, $\frac{1}{12}$ grain iron iodide, 5 grains potassium iodide and $\frac{1}{2}$ grain ammonium iodide.

Elixir Five Iodides. (Pentiodides).

Elixir Four Iodides, as above,	16 fl.ounces
Calcium Iodide,	32 grains

Rub the calcium iodide with the elixir four iodides until dissolved, and filter. A fl.drachm contains $\frac{1}{128}$ grain arsenic iodide, $\frac{1}{12}$ grain iron iodide, 5 grains potassium iodide, $\frac{1}{2}$ grain ammonium iodide and $\frac{1}{4}$ grain calcium iodide.

Elixir Ipecac.

Fluidextract of Ipecac,	1 fl.ounce
Elixir,	15 fl.ounces

This may also be made by macerating 1 ounce of powdered ipecac in a pint of elixir for several days, and filtering. A fl.drachm contains $3\frac{1}{2}$ grains of ipecac. The dose as an expectorant etc., is a teaspoonful or less, as an emetic, a tablespoonful or more.

Elixir Ipecac and Opium. Dover's Elixir.

Opium, in powder,	128 grains
Ipecac, in powder,	128 grains
Elixir,	1 pint

Macerate the powders in the elixir, with occasional agitation for a week, and filter.

This may also be made by taking

Tincture of Opium,	2¾ fl.ounces
Fluidextract of Ipecac,	¼ fl.ounce
Elixir,	13 fl.ounces

Mix, let stand, and filter. A fl.drachm of this elixir represents 1 grain each, opium and ipecac, and is equivalent to 10 grains of Dover's Powder. Deodorized tincture of opium is to be preferred for making this elixir, but is not directed, as it is not a complete representative of powdered opium.

Elixir Iron Bromide.

Iron Bromide,	384 grains
Potassium Citrate,	640 grains
Water,	2 fl.ounces
Elixir, sufficient to make	1 pint

Dissolve the potassium citrate in 12 ounces of the elixir. Dissolve the iron salt in 2 ounces of water and mix the solutions, filter, and add enough elixir, if necessary, to make a pint. A fl.drachm contains 3 grains of iron bromide. The potassium citrate is added to overcome the styptic disagreeable taste of the iron bromide. The dose is from ⅓ to 1 teaspoonful.

Elixir Iron Chloride, Tasteless. Elixir Muriate of Iron, Tasteless.

Potassium Citrate,	400 grains
Tincture Iron Chloride,	640 minims
Elixir, sufficient to make	1 pint

Dissolve the salt in the elixir and add the tincture. A fl.drachm contains 5 minims of tincture iron chloride, rendered tasteless by the addition of potassium citrate. The dose is a teaspoonful or more.

Elixir Iron Chloride and Arsenic.

Tincture Iron Chloride,	320 minims
Solution Arsenic Chloride,	640 minims
Potassium Citrate,	240 grains
Elixir, enough to make	1 pint

Dissolve the salt in the elixir, add the tincture of iron, and lastly the solution. A fl.drachm contains 6 drops tincture of iron and about ⅓ grain of arsenic. The dose is a teaspoonful.

Elixir Iron Citrate.

Iron Citrate and Ammonium,	256 grains
Elixir, sufficient to make	1 pint

Dissolve the iron salt by rubbing with separate portions of the

elixir, and filter. A fl.drachm contains 2 grains of soluble iron citrate. The dose is from a teaspoonful to a tablespoonful.

Elixir Iron Citrate and Quinine.

Iron and Quinine Citrate,	256 grains
Elixir, sufficient to make	1 pint

Dissolve the salt by rubbing with separate portions of the elixir, and filter. This may also be made by dissolving 192 grains of iron and ammonium citrate and 64 grains quinine sulphate in a pint of elixir. A fl.drachm contains 2 grains of the salt, representing about $\frac{1}{2}$ grain quinine. The dose is a teaspoonful or more.

Elixir Iron Citrate, Quinine and Strychnine.

Strychnine Sulphate,	1 $\frac{1}{4}$ grains
Elixir Iron and Quinine Citrate,	1 pint

Dissolve the strychnine salt by rubbing with separate portions of the elixir, or add 1 $\frac{1}{4}$ fl.drachms solution of strychnine sulphate.

This may also be made by dissolving 256 grains of the compound salt, iron citrate, quinine and strychnine, in a pint of elixir. A fl.-drachm contains 1 $\frac{1}{2}$ grains iron, $\frac{1}{2}$ grain quinine, and $\frac{1}{100}$ grain strychnine sulphate.

Elixir Iron Hypophosphite.

Solution of Iron Hypophosphite,	2 fl.ounces
Elixir,	14 fl.ounces

Mix them. A fl.drachm contains 1 grain hypophosphite of iron. The dose is a teaspoonful.

Elixir Iron Iodide. (Tasteless).

Tasteless Iron Iodide,	256 grains
Elixir,	1 pint

Dissolve the salt by rubbing with the elixir. A fl.drachm contains 2 grains tasteless iron iodide—a salt formerly patented by J. Cruse. The dose is a teaspoonful.

Elixir Iron Lactate.

Solution "Iron Protoxide,"	1 fl.ounce
Lactic Acid, concentrated,	1 $\frac{1}{2}$ fl.drachms
Elixir, sufficient to make	1 pint

Mix them. A fl.drachm represents 1 grain iron lacto-citrate. The dose is a teaspoonful or more. The elixir iron lactate may also be made by dissolving 128 grains iron lactate in a pint of elixir, and adding 1 $\frac{1}{2}$ fl.drachms lactic acid.

Elixir Iron Lactate and Pepsin.

Pepsin, saccharated,	256 grains
Elixir Iron Lactate,	1 pint

Macerate the pepsin in the elixir for several days, and strain. A fl.drachm contains 2 grains saccharated pepsin and 1 grain iron lactate. Dose, a teaspoonful or two.

Elixir Iron Phosphate.

Soluble Iron Phosphate,	256 grains
Water,	2 fl.ounces
Elixir, sufficient to make	1 pint

Dissolve the iron phosphate in the water by the aid of heat, and add the elixir. A fl.drachm contains 2 grains of iron phosphate. Dose, a teaspoonful or more.

Elixir Iron Phosphate and Quinine.

Soluble Iron Phosphate,	256 grains
Quinine Sulphate,	128 grains
Diluted Phosphoric Acid,	150 minims
Water,	2 fl.ounces
Glycerin,	2 fl.ounces
Elixir,	12 fl.ounces

Mix the elixir and acid and dissolve the quinine salt in the mixture by the aid of gentle heat. Dissolve the iron phosphate in the water and glycerin by the aid of heat, and while both the solutions are still hot, add the quinine solution to the iron solution. When cool, filter.

It is necessary that the solutions be quite warm, about 160°F., and that they be gradually mixed together, otherwise a gelatinous mass, instead of a clear solution will result. The quinine solution should be added to the iron solution. A fl.drachm contains 2 grains iron phosphate and 1 grain of quinine. Dose, a teaspoonful or more.

Elixir Iron Phosphate, Quinine and Strychnine.

Strychnine Sulphate,	2 grains
Elixir Iron Phosphate and Quinine,	1 pint

Dissolve the strychnine salt by rubbing with separate portions of the elixir, or add 2 drachms strychnine solution to a pint of the elixir.

This may also be made as directed in the previous formula, by adding 2 grains of strychnine sulphate to the ingredients therein named and proceeding in the same manner. A fl.drachm contains 2 grains of iron phosphate, 1 grain of quinine and $\frac{1}{64}$ grain of strychnine. The proportion of strychnine as prepared by manufacturers varies considerably, some using only $\frac{1}{120}$ grain, while others use as much as $\frac{1}{50}$ grain in a fl.drachm.

Elixir Iron Pyrophosphate. Ferro-phosphated Cordial Elixir.

Iron Pyrophosphate,	256 grains
Water,	1 fl.ounce
Elixir,	15 fl.ounces

Dissolve the iron pyrophosphate in the water by the aid of heat, and add the elixir. After standing, filter. A fl.drachm contains 2 grains of the iron salt.

Elixir Iron Pyrophosphate and Quinine.

The foregoing elixirs of iron pyrophosphate and quinine, being neutral, cannot be made to hold more than $\frac{1}{2}$ grain of quinine in a fl.drachm of solution. The following formula is made to contain 1 grain in a fl.drachm.

Quinine Sulphate,	128 grains
Diluted Phosphoric Acid,	5 fl.drachms
Alcohol,	1 fl.ounce
Ammonia Water, q. s., about	20 minims
Elixir, sufficient to make	1 pint

Dissolve the quinine salt in 8 ounces of the elixir, the alcohol, and the phosphoric acid. Dissolve the iron pyrophosphate in 1 ounce of water, by the aid of heat, and add to the solution 6 ounces of elixir and 20 minims ammonia water. When the two solutions, the quinine in one, and the iron in the other, are ready, add the one containing the quinine very gradually to the one containing the iron, giving time for the precipitate formed to be dissolved after adding each portion before adding more. If not clear when all is added, add enough ammonia water, mixed with a little elixir, to make clear, and filter.

A fl.drachm contains 2 grains of the iron salt and 1 grain quinine. The dose is a teaspoonful.

Elixir Iron Pyrophosphate and Quinine. (Neutral).

Quinine Sulphate,	64 grains
Citric Acid,	10 grains
Iron Pyrophosphate,	128 grains
Ammonia Water, q. s.,	20 to 30 drops
Water,	1 fl.ounce
Elixir,	15 fl.ounces

Dissolve the citric acid in a portion of the elixir and rub the quinine salt in a mortar with the solution, then add the remainder of the elixir and warm the mixture gently by a water-bath until the salt is entirely dissolved; dissolve the iron salt by the aid of heat in the water, and add to the solution 20 drops of 10 percent. ammonia water, then add the quinine solution to the iron solution and mix them thoroughly. When cool, filter. If the elixir, when cool, remains cloudy, add a few drops more of ammonia water to make clear.

A fl.drachm contains 1 grain of iron salt and $\frac{1}{2}$ grain quinine. The dose is a teaspoonful to a dessertspoonful.

This elixir was formerly prescribed and sold as Elixir Phosphate of Iron and Quinine, but since the introduction of a soluble scale iron phosphate, an elixir containing the iron phosphate is furnished.

Elixir Iron Pyrophosphate, Quinine and Arsenic.

Fowler's Solution of Arsenic, 256 minims

Elixir Iron Pyrophosphate and Quinine, 14½ fl.ounces

Mix them. A fl.drachm contains 2 grains iron, 1 grain quinine, and 2 minims Fowler's Solution.

Elixir Iron Pyrophosphate, Quinine and Strychnine.

Strychnine Sulphate, 2 grains

Elixir Iron Pyrophosphate and Quinine, 1 pint

Dissolve the strychnine salt by rubbing with separate portions of the elixir, or add 2 fl.drachms strychnine solution to a pint of elixir iron pyrophosphate and quinine. A fl.drachm contains 2 grains of the iron salt, 1 grain quinine, and $\frac{1}{64}$ grain strychnine.

Elixir Iron Pyrophosphate, Quinine and Strychnine. (Neutral).

Strychnine Sulphate, 2 grains

Elixir Iron Pyrophosphate and Quinine, 1 pint

Dissolve the strychnine salt by rubbing with separate portions of the elixir, or add 2 fl.drachms of strychnine solution to a pint of elixir iron pyrophosphate and quinine. It may also be made the same as directed for the preceding formula by adding to the solution of citric acid in elixir 2 grains of strychnine sulphate before adding the quinine salt.

A fl.drachm contains 1 grain of the iron salt, $\frac{1}{2}$ grain quinine, and $\frac{1}{64}$ grain strychnine. The dose is a teaspoonful or more.

This elixir was formerly called Elixir Phosphate of Iron, Quinine and Strychnine, as explained in the foregoing formula.

Elixirs of Iron Pyrophosphate and Cinchonidine, with their various combinations, are made in the same manner as Elixirs Iron Pyrophosphate and Quinine, only using chinchonidine sulphate instead of quinine sulphate.

A great variety of combinations are made with elixir iron pyrophosphate, quinine and strychnine. It is unnecessary to give detailed formula for them as they are made simply by adding various salts and solutions to the elixir.

Elixir of Iron, Quinine and Strychnine.

The elixir of iron phosphate, quinine and strychnine is quite generally used when elixir of iron, quinine and strychnine is prescribed, but the following combination possesses some advantages:

Tincture Iron Citro-Chloride, 320 minims

Quinine Sulphate or Muriate, 128 grains

Strychnine Sulphate, 2 grains

Elixir, sufficient to make 16 fl.ounces

Rub the strychnine salt to a fine powder in a mortar and dissolve it by adding separate portions of elixir and rubbing; rub the quinine

salt with the elixir, add the tincture citro-chloride of iron, and enough elixir to make a pint, and after standing, filter if necessary. This makes a very nice preparation, is very easily made and keeps well without precipitation or decomposition, as is frequently the case with elixirs of phosphate of iron in combination.

A fl.drachm contains equivalent to 6 drops tincture of iron, 1 grain quinine, and $\frac{1}{64}$ grain strychnine. Dose, a teaspoonful.

Elixir Iron and Strychnine Citrate.

Strychnine Sulphate,	1¼ grains
Iron and Ammonium Citrate,	256 grains
Elixir, sufficient to make	1 pint

Dissolve the salts by rubbing with the elixir.

This may also be made from the compound salt, iron and strychnine citrate, by dissolving 256 grains in a pint of elixir.

A fl.drachm contains 2 grains iron and $\frac{1}{100}$ grain strychnine. The dose is a teaspoonful to a dessertspoonful.

Elixir Iron Valerianate.

An elixir of iron valerianate may be made by dissolving 128 grains iron valerianate, 60 grains of citric acid, and 60 grains potassium citrate in a pint of elixir, but it is more expensive and less satisfactory than the elixir ammonium valerianate and iron, which is therapeutically the same.

Elixir Jaborandi. Elixir Pilocarpus.

Fluidextract of Jaborandi,	2¾ fl.ounces
Alcohol,	2 fl.ounces
Elixir,	12 fl.ounces

Mix, and after standing, filter, adding a little powdered magnesium carbonate to the filter. A fl.drachm represents 10 grains of jaborandi. The dose is a teaspoonful to a dessertspoonful.

Elixir Juniper Berries.

Fluidextract of Juniper Berries,	2¾ fl.ounces
Holland Gin,	4 fl.ounces
Elixir,	10 fl.ounces
Magnesium Carbonate,	1 drachm

Mix the liquids, rub with magnesium carbonate in a mortar, and filter. A fl.drachm represents 10 grains juniper berries. The dose is a teaspoonful or more.

Elixir Kairine.

Kairine,	128 grains
Elixir,	1 pint

Dissolve the salt in the elixir. A fl.drachm contains 1 grain kairine. The dose is a teaspoonful or two.

Elixir Kola.

Kola Nut, in fine powder,	1½ ounces
Magnesium Carbonate,	½ ounce
Alcohol,	2 fl.ounces
Elixir, sufficient to make	16 fl.ounces

Rub the powdered kola and magnesium carbonate together and add the alcohol to make a pasty mass, then rub with 4 ounces of the elixir in a mortar and pour into a covered glass percolator; after standing 12 hours begin to percolate, adding elixir through the percolator until 16 ounces have passed.

A teaspoonful represents a little more than 5 grains of kola. The dose is from 1 to 2 teaspoonfuls or more.

Fluidextract of kola may be used instead, and rubbed with magnesium carbonate as directed.

Elixir Kola-Celery.

Kola Nut, in fine powder,	1½ ounce
Celery Seed, in fine powder,	1½ ounce
Magnesium Carbonate,	½ ounce
Alcohol,	3 fl.ounces
Elixir, sufficient to make	17 fl.ounces

Make in the same manner as elixir kola, (above).

A fl.drachm represents 5 grains each of kola and celery.

Elixir Kola and Celery Compound.

Elixir Kola and Celery,	16 fl.ounces
Fluidextract Coca,	1½ ounce
Fluidextract Black Haw,	1½ ounce

Mix, and after standing, filter if necessary.

A fl.drachm represents 5 grains each of kola, celery, coca and black haw.

Elixir Lactated Pepsin.

A line of Lactated Pepsin Elixirs and combinations are made by several manufacturers from Compound powder of Pepsin, used in the same manner and proportion as Lactopeptine or Pepsin. The formula for this powder will be found under Pulveres. The elixirs are made up in several different proportions of the powder to the elixir,—from 40 to 96 grains of the powder to an ounce,—by dissolving the powder in the elixir.

The Compound Elixirs of Lactated Pepsin, with Bismuth, Calisaya, Gentian, Iron, Strychnine, Quinine etc., may be made in the same manner as Elixirs of Lactopeptine or Pepsin by taking of Compound Powder of Pepsin, 640 grains, and 1 pint of the required Elixir.

A fl.drachm of the above elixir will contain 5 grains of the pepsin compound, combined with the specified elixir.

Elixir Lactopeptine.

Lactopeptine,	384 grains
Glycerin,	2 fl.ounces
Water,	2 fl.ounces
Elixir,	12 fl.ounces

Macerate the lactopeptine in the mixed liquids for several days in a warm place. Color with cochineal coloring and filter.

A fl.drachm contains 3 grains lactopeptine. The dose is a teaspoonful to a dessertspoonful.

A great variety of combinations of lactopeptine with other preparations may be made by macerating 256 grains lactopeptine in a pint of the required elixir. The combinations of lactopeptine with calisaya and gentian elixirs will be found under those headings.

Elixir Lactopeptine and Bismuth.

Bismuth and Ammonium Citrate,	128 grains
Elixir Lactopeptine (uncolored),	1 pint

Dissolve the bismuth salt with half an ounce of water by the aid of a few drops of ammonia water, and add to the elixir.

A fl.drachm contains 3 grains lactopeptine and 1 grain of bismuth. The dose is a teaspoonful or two.

Elixir Lactopeptine, Bismuth and Strychnine.

Strychnine Sulphate,	1¼ grain
Elixir Lactopeptine and Bismuth,	1 pint

Dissolve the strychnine salt by rubbing with separate portions of the elixir, or add equivalent quantity of solution of strychnine.

A fl.drachm contains 3 grains lactopeptine, 1 grain bismuth, and 1/100 grain strychnine. The dose is a teaspoonful to a dessertspoonful.

Elixir Lactucarium.

Lactucarium,	256 grains
Elixir,	1 pint

Macerate the lactucarium in the elixir 24 hours; then rub it to a smooth mixture with the elixir, and after standing a day or two, filter.

A fl.drachm represents 2 grains of lactucarium. Dose a teaspoonful or more.

Elixir Laxative.

A number of preparations by this name have been quite popular. The following formula makes a preparation similar to the one which has been best received.

Senna, in coarse powder,	2 ounces av.
Gentian, in coarse powder,	½ ounce av.
Cardamom Seed, in fine powder,	1 drachm
Coriander Seed, in fine powder,	1 drachm

Elixir Percolating Menstruum,	1	pint
Sugar,	5	ounces av.
Soluble Elixir Flavoring,	1	ounce av.
Soluble Iron Phosphate,	128	grains

Make by percolation as directed. Detannate with $\frac{1}{2}$ ounce white of egg. Dissolve the iron salt in 1 ounce of hot water, and add to the detannated elixir. It may also be made by adding 2 fl.ounces fluid extract senna and $\frac{1}{2}$ fl.ounce tincture cardamom seed to 14 $\frac{1}{2}$ fl.ounces of elixir gentian and iron phosphate. The dose is a dessertspoonful to a tablespoonful as a laxative and tonic.

Other laxative elixirs are noted under the Cathartic Elixirs and among the Standard Remedies.

Elixir Licorice. Elixir Glycyrrhiza.

Licorice Root, in coarse powder,	2 $\frac{3}{4}$	ounces av.
Elixir Percolating Menstruum, q. s., about	1	pint
Ammonia Water,	1	fl.drachm
Sugar,	5	ounces av.
Soluble Elixir Flavoring,	1	fl.ounce

Make by percolation as directed, or it may be made by mixing fluidextract of licorice, 2 $\frac{3}{4}$ ounces with ammonia water, 20 minims, and elixir, 14 fl.ounces.

A fl.drachm represents 10 grains of licorice root.

This vehicle is much used for bitter medicines, as quinine etc.

Elixir Licorice Compound. Elixir Glycyrrhiza Compound.

Aromatic Elixir Glycyrrhiza.

Licorice Root, in coarse powder,	1 $\frac{1}{2}$	ounces av.
Wild Cherry, in coarse powder,	1	ounce av.
Cardamom Seed, in fine powder,	1	drachm
Coriander Seed, in fine powder,	1	drachm
Cinnamon, in fine powder,	1	drachm
Elixir Percolating Menstruum,	1	pint
Ammonia Water,	1	fl.drachm
Sugar,	5	ounces av.
Soluble Elixir Flavoring,	1	fl.ounce

Make by percolation as directed, or add the fluidextracts of the drugs to the elixir.

This elixir is used chiefly as a vehicle for quinine and other bitter medicines.

Elixir Lithium Citrate.

Lithium Citrate,	256	grains
Elixir, sufficient to make	1	pint

Dissolve the salt in the elixir, and filter. A fl.drachm contains 2 grains lithium citrate. The dose is from 1 to 2 teaspoonfuls.

Elixir of Lithium Salts.

Elixirs of the bromide, citrate, carbonate or salicylate of lithium are sometimes ordered, but are seldom used. They may be made by taking

The Lithium Salt,	640 grains
Elixir, sufficient to make	16 fl.ounces

Dissolve the lithium salt by rubbing in a mortar with the elixir.

The bromide requires a little citric acid to the solution; the carbonate requires enough citric acid added to dissolve it in the solution, but when this is added it really becomes an elixir of lithium citrate.

Elixir Lithiated Strontium Compound.

Strontium Salicylate,	256 grains
Strontium Iodide,	128 grains
Lithium Salicylate,	256 grains
Elixir, sufficient to make	1 pint

Mix the salts and dissolve them in enough elixir to make 1 pint. A fl.drachm contains 5 grains of the strontium and lithium salts. Dose 1 to 2 teaspoonfuls.

Elixirs of Malt and Compounds.

A number of elixirs of malt with various combinations have been made by manufacturers, but in this work they are included under the heading Maltum, which see.

Elixir Manaca and Salicylates.

Fluidextract Manaca,	2 $\frac{2}{3}$ fl.ounces
Sodium Salicylate,	2 ounces av.
Potassium Salicylate,	1 ounce av.
Lithium Salicylate,	$\frac{1}{4}$ ounce av.
Elixir, sufficient to make	1 pint

Mix, dissolve, and after standing, filter.

A fl.drachm represents 10 grains manaca, 7 grains sodium salicylate, 3 $\frac{1}{2}$ grains potassium salicylate, and nearly 1 grain lithium salicylate.

Elixir Mandrake Compound. Elixir Podophyllum Compound.

Mandrake (Podophyllum), in powder,	1 ounce av.
Leptandra, (Culver's Root), in powder,	1 ounce av.
Senna, in coarse powder,	1 ounce av.
Elixir Percolating Menstruum, q. s., about	18 fl.ounces
Sugar,	5 ounces av.
Soluble Elixir Flavoring,	1 fl.ounce

Make by percolation as directed, or mix the fluidextracts of the drugs with elixir, and filter through magnesium carbonate.

A fl.drachm contains about 3 $\frac{1}{2}$ grains each of the drugs.

The dose is a teaspoonful as a chologogue and laxative.

Elixir Matico Compound.

Matico, in coarse powder,	1 ounce av.
Buchu, in coarse powder,	1 ounce av.
Cubebs, in fine powder,	1 ounce av.
Elixir Percolating Menstruum, q. s., about	18 fl.ounces
Sugar,	5 ounces av.
Soluble Elixir Flavoring,	1 fl.ounce

Make by percolation as directed, or by mixing the fluidextracts of the drugs with elixir, rubbing with magnesium carbonate, and filtering. The dose is a teaspoonful or more.

Elixir Mono-bromated Camphor Compound.

Mono-bromated Camphor,	16 grains
Butyl-Chloral,	24 grains
Spirit of Cinnamon,	1½ fl.ounces
Elixir,	1½ fl.ounces
Tincture of Gelsemium,	80 minims
Syrup,	8 fl.ounces

Rub the butyl-chloral and the mono-bromated camphor with the spirit of cinnamon, add the tincture of gelsemium, then the elixir, then the syrup, mixing them well together. Dose, a teaspoonful.

Elixir Morphine.

Morphine Sulphate,	16 grains
Elixir,	1 pint

Mix and dissolve. A fl.drachm contains $\frac{1}{8}$ grain morphine sulphate. The dose is a teaspoonful. This preparation is of the same strength as the Liquor Morphine Sulphatis, formerly official, but is a better preparation as it will keep any length of time.

Elixir Morphine Bromide.

Morphine Bromide,	16 grains
Elixir,	1 pint

Dissolve the salt in the elixir. A fl.drachm contains $\frac{1}{8}$ grain morphine bromide. The dose is a teaspoonful.

Elixir Morphine Valerate.

Morphine Valerate,	16 grains
Elixir,	1 pint

Dissolve the salt by rubbing with separate portions of the elixir. A fl.drachm contains $\frac{1}{8}$ grain morphine valerate. Dose, 1 teaspoonful.

Elixir Nitroglycerin Compound.

Spirit of Nitroglycerin, U. S. P.,	150 minims
Fluidextract Digitalis,	64 minims
Tincture Strophanthus,	256 minims
Strychnine Sulphate,	2½ grains
Elixir, sufficient to make	1 pint

Mix with caution. A fl.drachm contains $\frac{1}{100}$ grain nitroglycerin, $\frac{1}{2}$ minim fluidextract digitalis, 2 minims tincture strophanthus, and $\frac{1}{50}$ grain strychnine sulphate.

Elixir Nux Vomica.

Tincture Nux Vomica,	640 minims
Diluted Sulphuric Acid,	2 fl.drachms
Elixir, sufficient to make	1 pint

Mix, and after standing, filter. A fl.drachm contains 5 minims tincture nux vomica. The dose is from $\frac{1}{2}$ to a teaspoonful.

Elixir Opium.

Opium, in powder,	128 grains
Elixir,	1 pint

Rub the opium with the elixir, and macerate for several days, then filter. It may also be made by mixing

Tincture of Opium,	258 fl.ounces
Elixir, sufficient to make	1 pint

An elixir of opium, deodorized, may be made in the same way from the deodorized tincture of opium. A fl.drachm of elixir opium represents 1 grain opium. The dose is a teaspoonful.

Elixir Orange. Elixir Aurantii.

Oil of Orange, fresh,	30 minims
Alcohol,	6 fl.ounces
Water,	10 fl.ounces
Magnesium Carbonate,	120 grains
Sugar,	5 ounces av,

Dissolve the oil of orange in the alcohol, rub the magnesium carbonate to a fine powder, and add to the water; then gradually add the mixture of magnesium to the solution of orange, and after mixing thoroughly, allow to stand; then filter clear and dissolve the sugar in the filtrate.

This elixir is known by many names, and used mostly as an adjuvant or simple elixir. It may also be made by macerating 4 ounces of fresh orange peel in half a pint of alcohol for several days, draining and pressing; then adding 8 ounces of water and 4 ounces of syrup, and filtering.

For other elixirs of orange see Simple Elixir, Aromatic Elixir, Adjuvant Elixir, Curaçoa Elixir etc.

Elixir Orange Compound. Elixir Vicerale Hoffmanni.

This elixir was formerly official in the German Pharmacopœia and is still frequently prescribed. The formula is as follows:

Orange Peel, cut,	50 parts or $3\frac{3}{4}$ ounces
Cinnamon,	10 parts or 6 drachms

Potassium Carbonate,	2½ parts or 90	grains
Sherry Wine,	250 parts or 19	fl.ounces
Extract of Gentian,	5 parts or 3	drachms
Extract of Wormwood,	5 parts or 3	drachms
Extract of Buckbean,	5 parts or 3	drachms
Extract of Cascarella,	5 parts or 3	drachms

Macerate the orange, cinnamon and potassium carbonate for 8 days in the wine, pour off, express, and dissolve the extracts in the liquid. The dose is a teaspoonful.

Elixir Pancreatin.

This elixir may be made from the fresh pancreas of the pig, as follows:

The pancreas of three pigs, chopped,	
Water,	20 fl.ounces
Macerate for 3 days in a cool place, then strain and add	
Elixir,	3 pints
Alcohol,	8 fl.ounces
Soluble Flavoring,	2 fl.ounces

After standing a few days, filter.

This may also be made from pancreatin:

Pancreatin,	1 ounce av.
Glycerin,	4 ounces av.
Elixir, sufficient to make	1 pint

Macerate the pancreatin for 24 hours or more in the elixir and glycerin, and filter. The dose is a dessertspoonful or more.

Elixir Pancreatin and Pepsin.

Saccharated Pepsin,	256 grains
Saccharated Pancreatin,	256 grains
Glycerin,	4 ounces av.
Elixir, sufficient to make	1 pint

Macerate the powders for 24 hours or longer in the elixir and glycerin, and filter. A fl.drachm contains 2 grains each of saccharated pancreatin and pepsin. The dose is a dessertspoonful.

Elixir Pancreatin, Pepsin and Bismuth.

Bismuth and Ammonium Citrate,	64 grains
Elixir Pancreatin and Pepsin,	1 pint

Dissolve the bismuth salt in ½ ounce of water by the aid of a few drops of ammonia water, and add to the elixir. A fl.drachm contains 2 grains each of saccharated pancreatin and pepsin, and ½ grain bismuth. The dose is a dessertspoonful.

Other combinations of pancreatin and pepsin may be made in a similar manner.

Elixir Paraldehyd.

Paraldehyd,	640 minims
Elixir, sufficient to make	1 pint

Mix them. A fl.drachm contains 5 minims paraldehyd. The dose is a teaspoonful to a tablespoonful as a hypnotic or anodyne.

Elixir Pareira Brava.

Fluidextract Pareira Brava,	2¾ fl.ounces
Elixir,	14 fl.ounces

Mix them, and, after standing, filter through a little magnesium carbonate. It may also be made by percolating the drug with elixir, as directed. A fl.drachm represents 10 grains of the drug. The dose is a teaspoonful to a dessertspoonful.

Elixir Pepsin.

Elixir of pepsin may be prepared from the fresh stomachs of the pig or calf, or from the saccharated pepsins, or the pure pepsins, which are furnished by manufacturers. Elixirs of pepsin desired to combine with other preparations, as bismuth, iron etc., should be made from the saccharated pepsin. Some manufacturers call wine of pepsin and its combinations elixirs of pepsin.

The value of elixirs of pepsin and their combinations with various salts as are found on the market has been seriously questioned, and not without reason, as they present many incompatibilities; but these combinations are much used and are perhaps as valuable as many other compounds that are prescribed.

Elixir pepsin may be prepared from the fresh stomachs as follows:

The stomachs of 6 pigs,	
Water,	6 pints
Glycerin,	20 fl.ounces
Hydrochloric Acid,	2 fl.ounces

Dissect the lining membrane from the stomachs, and digest them for three days in a mixture of the liquids, then strain, and add

Elixir,	3 pints
Alcohol,	8 fl.ounces

and, after standing a few days, filter.

This may be used as a simple elixir of pepsin, or may be combined with salts which are not incompatible with acids; but it forms precipitates with bismuth and some other preparations.

Elixir Pepsin.

Made from Saccharated Pepsin.

Saccharated Pepsin,	256 grains
Water,	3 fl.ounces

Glycerin,	3 fl.ounces
Elixir,	10 fl.ounces

Macerate the pepsin in the liquids for 24 hours or longer and strain or filter through coarse filtering paper. A fl.drachm contains 2 grains of saccharated or official pepsin. The dose is a teaspoonful or more.

Elixir pepsin may also be made from scale pepsin by first reducing it to a powder and macerating 64 grains in 3 ounces each of water and glycerin and 10 ounces elixir. As thus prepared it is more than double the strength of elixir pepsin as made from saccharated pepsin, representing in a fl.drachm the equivalents of 5 grains saccharated pepsin. It may be colored with a little caramel if desired.

Elixirs of pepsin are very slow to filter because of the mucous which covers the surface of the paper. They are therefore better strained through muslin.

This elixir pepsin should be used for combining with bismuth, iron salts etc.

Elixirs of Pepsin.

Scale or crystal pepsin is now quite generally used for making elixirs of pepsin, instead of saccharated pepsins which were formerly used for making pepsin elixirs. Elixir of pepsin has been mostly superseded by essence pepsin, (see Essences); but the combinations of elixir pepsin are still generally made by the formulas directed in this work.

A plain elixir of pepsin may be made with the scale pepsin as follows:

Scale Pepsin,	128 grains
Glycerin,	2 fl.ounces
Hydrochloric Acid,	20 minims
Elixir, sufficient to make	16 fl.ounces

Mix the glycerin, acid and elixir and add the pepsin, agitate frequently until dissolved, and filter. A fl.drachm contains 1 grain pure pepsin.

Elixir Pepsin and Bismuth.

Bismuth and Ammonium Citrate,	128 grains
Elixir Pepsin,	1 pint

Dissolve the bismuth salt in $\frac{1}{2}$ ounce of water with the aid of a few drops of ammonia water, and add to the elixir. It may be colored, if desired, with a little caramel. A fl.drachm contains 1 grain bismuth combined with elixir of pepsin. The dose is a teaspoonful or more.

Elixir Pepsin, Bismuth and Iron.

Iron and Ammonium Citrate,	128 grains
Elixir Pepsin and Bismuth,	1 pint

Dissolve the iron salt by rubbing with separate portions of the elixir. This may also be made with iron pyrophosphate instead of citrate, by dissolving 128 grains of iron pyrophosphate in 1 ounce of hot water and adding to the elixir. A fl.drachm contains 1 grain each of bismuth and iron combined with elixir pepsin. The dose is a teaspoonful to a dessertspoonful.

Elixir Pepsin, Bismuth, Iron and Strychnine.

Strychnine Sulphate,	1¼ grains
Elixir Pepsin, Bismuth and Iron,	1 pint

Dissolve the strychnine salt by rubbing with separate portions of the elixir, or add 1¼ fl.drachms solution of strychnine to a pint of the elixir. This may also be made by dissolving 128 grains iron citrate or pyrophosphate in a pint of the elixir pepsin, bismuth and strychnine.

A fl.drachm contains 1 grain each bismuth and iron and 1/100 grain strychnine sulphate, combined with elixir pepsin. The dose is a teaspoonful to a dessertspoonful.

Elixir Pepsin, Bismuth and Strychnine.

Strychnine Sulphate,	1¼ grains
Elixir Pepsin and Bismuth,	1 pint

Dissolve the strychnine salt by rubbing with separate portions of the elixir, the filter. This may be made by adding 1¼ drachm of solution of strychnine to a pint of elixir pepsin and bismuth.

A fl.drachm contains 1 grain bismuth and 1/100 grain strychnine sulphate, combined with elixir pepsin. Dose, a teaspoonful to a dessertspoonful.

Elixir Pepsin and Iron.

Soluble Iron Phosphate,	128 grains
Water,	1 fl.ounce
Elixir Pepsin,	15 fl.ounces

Dissolve the iron salt in the water by the aid of heat and add the elixir. This elixir may also be made with the same quantity of iron and ammonium citrate, or of iron pyrophosphate in place of the phosphate.

A fl.drachm contains 1 grain of the iron salt combined with elixir pepsin. The dose is a dessertspoonful.

Elixir Pepsin and Strychnine.

Strychnine Sulphate,	1¼ grain
Elixir Pepsin and Lactic Acid,	1 pint

Dissolve the strychnine salt by rubbing with separate portions of the elixir, or add 1¼ fl.drachms solution of strychnine to a pint of the elixir.

A fl.drachm contains 1/100 grain strychnine sulphate, combined with elixir pepsin. The dose is from a teaspoonful to a dessertspoonful.

Elixir Pepsin, Iron and Strychnine.

Strychnine Sulphate,	1¼ grains
Elixir Pepsin and Iron,	1 pint

Dissolve the strychnine salt by rubbing with separate portions of the elixir, or add 1¼ fl.drachms solution of strychnine to a pint of the elixir.

A fl.drachm contains 1 grain iron and $\frac{1}{100}$ grain strychnine sulphate, combined with elixir pepsin. The dose is a teaspoonful to a dessertspoonful.

Elixir Pepsin and Lactic Acid. Elixir Pepsin Lactated.

Concentrated Lactic Acid,	64 minims
Scale Pepsin,	128 grains
Glycerin,	3 fl.ounces
Water,	3 fl.ounces
Elixir,	15 fl.ounces

Rub the pepsin to a powder and add to the mixed liquids, allow to stand several days, with frequent agitation, then strain through muslin.

A fl.drachm contains 1 grain pure pepsin (equivalent to 10 grains saccharated pepsin) and $\frac{1}{2}$ minim lactic acid. The dose is a teaspoonful to a dessertspoonful.

This is one of the best liquid preparations of pepsin, but it is not compatible with soluble bismuth or iron pyrophosphate. It is called by some manufacturers "Aromatic Solution of Pepsin," "Liquor Pepsin" etc. The Elixirs of Pepsin and Lactic Acid, and their combinations are known as Elixirs of Pepsin Lactated or Lactated Pepsin.

This elixir is made by some manufacturers by taking 640 grains of saccharated pepsin, instead of scale pepsin, and it is frequently made with much less, from 2 to 3 grains of saccharated pepsin being used for each fl.drachm.

Elixir Pepsin and Quinine.

Quinine Sulphate,	128 grains
Elixir Pepsin and Lactic Acid,	1 pint

Rub the quinine salt with the elixir to dissolve.

A fl.drachm contains 1 grain quinine sulphate combined with the pepsin elixir. The dose is a teaspoonful.

Elixir Pepsin, Quinine and Iron.

Soluble Iron Phosphate,	128 grains
Water,	1 fl.ounce
Elixir Pepsin and Quinine,	15 fl.ounces

Dissolve the iron salt in the water by the aid of heat and add the elixir.

A fl.drachm contains 1 grain each of iron and quinine combined with elixir pepsin. The dose is a teaspoonful.

Elixir Pepsin, Quinine, Iron and Strychnine.

Strychnine Sulphate,	1¼ grain
Elixir Pepsin, Quinine and Iron,	1 pint

Dissolve the strychnine salt by rubbing with separate portions of the elixir, or add 1¼ fl.drachms solution of strychnine to a pint of the elixir.

A fl.drachm contains 1 grain each quinine and iron and 1/100 grain strychnine sulphate, combined with elixir pepsin. The dose is a teaspoonful.

Elixir Pepsin, Quinine and Strychnine.

Strychnine Sulphate,	1¼ grain
Elixir Pepsin and Quinine,	1 pint

Dissolve the strychnine salt by rubbing with separate portions of the elixir, or add 1¼ fl.drachms solution of strychnine to a pint of the elixir.

A fl.drachm contains 1 grain quinine and 1/100 grain strychnine sulphate, combined with elixir pepsin. The dose is a teaspoonful.

Elixir Pepsin and Wafer Ash. Elixir Pepsin and Ptelea.

Fluidextract of Wafer Ash (Ptelea),	1 fl.ounce
Elixir Pepsin,	15 fl.ounces

Mix them, and after standing, filter clear through a little powdered charcoal.

A fl.drachm represents the soluble constituents of 3½ grains wafer ash, combined with elixir pepsin. The dose is a teaspoonful to a dessertspoonful.

A glycerite of pepsin and wafer ash is also made. See glycerites.

Other Pepsin Elixirs.

A great variety of combinations of pepsin with other substances in the forms of elixirs may be made by adding pepsin to other elixirs, or other substances to elixir pepsin.

Elixir Phosphates Compound.

Concentrated Solution of Phosphates Compound,	2 fl.ounces
Elixir,	14 fl.ounces

Mix them. The dose is a teaspoonful, containing about 3½ grains of the mineral phosphates in solution, with excess of phosphoric acid.

Elixir Phosphoric Acid.

Phosphoric Acid, (85%), by weight,	2 ounces
Glycerin, by weight,	4 ounces
Elixir, by weight,	11 ounces

Mix them. This elixir, if the 85% U. S. phosphoric acid is used, has the same acid percentage as diluted phosphoric acid, (10%), and may be prescribed in place of it to advantage as the sharp acid taste is mitigated.

Elixir Phosphori. Elixir of Phosphorus.

This was formerly official in the U. S. P. The formula is:

Spirit of Phosphorus,	219 Cc. or 3½ fl.ounces
Oil of Anise,	2 Cc. or 16 minims
Glycerin,	550 Cc. or 8⅞ fl.ounces
Aromatic Elixir, to make	1000 Cc. or 16 fl.ounces

To the spirit of phosphorus, contained in a graduated bottle, add the oil of anise and glycerin, and mix them by repeatedly inverting the bottle, until they form a clear liquid. Then add the aromatic elixir in several portions, gently agitating after each addition until a transparent liquid is obtained, and the liquid measures 1000 Cc. (or 16 fl.ounces). Each Cc. of the liquid represents ¼ milligramme (0.00025 Gm.) of phosphorus.

The N. F. formula for this elixir is nearly the same. It represents 1/50 grain of phosphorus in a fl.drachm.

Elixir Phosphorus.

Phosphorus, fresh, (not oxidized),	1¼ grains
Absolute Alcohol,	1 fl.ounce

Add the phosphorus to the alcohol contained in a small bottle and stop tightly, dissolve the phosphorus in the alcohol by gentle heat of water-bath, then mix.

Glycerin,	3 fl.ounces
Elixir,	12 fl.ounces

and warm the mixture to about 140° F., and while the solution of phosphorus is still warm, add the mixture to it and mix thoroughly. Set aside in a well-stoppered bottle in a cool place.

A fl.drachm contains 1/100 grain of phosphorus. The dose is a teaspoonful to a dessertspoonful.

The B. P. C., 1901 Formulary directs:

Compound Tincture of Phosphorus, (Br.),	4 fl.ounces
Glycerin,	16 fl.ounces

Add the tincture to the glycerin and shake well. This elixir should be freshly prepared and protected from the light, in full bottles. A fl.drachm contains 1/50 grain of phosphorus. Dose, 15 to 60 minims.

Elixir Phosphorus Compound. Elixir Phosphorus and Nux Vomica.

Tincture of Nux Vomica,	384 minims
Elixir Phosphorus; sufficient to make	1 pint

Mix them by adding the elixir gradually to the tincture.

A fl.drachm contains 3 minims of tincture nux vomica and $\frac{1}{100}$ grain phosphorus. The dose is a teaspoonful.

Elixir Phosphorus, Iron, Quinine and Strychnine.

Elixir Phosphorus, 8 fl.ounces

Elixir Iron Phosphate, Quinine and Strychnine, 8 fl.ounces

Mix them. A fl.drachm contains 1 grain quinine, $\frac{1}{50}$ grain strychnine, and $\frac{1}{200}$ grain of phosphorus. The dose is a teaspoonful to a dessertspoonful.

Elixir Pichi Compound.

Fluidextract Pichi, 4 fl.ounces

Fluidextract Triticum, 2 fl.ounces

Fluidextract Corn Silk, 1 fl.ounce

Elixir, sufficient to make 1 pint

Mix them. A fl.drachm represents about 15 grains pichi, $7\frac{1}{2}$ grains triticum, 4 grains corn silk. This is highly recommended for kidney and bladder trouble and calculi.

Elixir Pichi and Saw Palmetto Compound.

Fluidextract Saw Palmetto, 2 fl.ounces

Elixir Pichi Compound, 14 fl.ounces

Mix them.

Elixir Pink Root Compound. Anthelmintic Elixir.

Pink Root, in coarse powder, 2 ounces av.

Senna Leaves, in coarse powder, 1 ounce av.

Balmony, $\frac{1}{2}$ ounce av.

Elixir Percolating Menstruum, q. s., about 18 fl.ounces

Sugar, 5 ounces av.

Soluble Elixir Flavoring, 1 fl.ounce

Make by percolation as directed.

A fl.drachm represents about 7 grains of pink root, $3\frac{1}{2}$ grains senna, and 2 grains balmony. This is an excellent preparation for worms, and is given in doses of a teaspoonful or more.

Elixir Potassium Acetate.

Potassium Acetate, 640 grains

Elixir, sufficient to make 1 pint

Dissolve and filter. A fl.drachm contains 5 grains potassium acetate. Dose 1 to 4 teaspoonfuls.

Elixir Potassium Bromide.

Two strengths of this elixir are common—5 grains and 10 grains of potassium bromide in a fl.drachm. This is liable to confusion with physicians in prescribing it, and for that reason we prefer to stick to

our old formula of 10 grains to a fl.drachm, which is none too strong for general use:

Potassium Bromide,	1280 grains
Elixir, sufficient to make	1 pint

Rub the bromide to a coarse powder, and dissolve by agitation in the elixir. Some druggists and manufacturers color this elixir red with carmine solution, and some leave it colorless. It should be kept uniform, so that customers may not be suspicious when prescriptions are refilled.

A fl.drachm represents 10 grains of the salt. The dose is from a teaspoonful to a tablespoonful.

If the elixir containing but 5 grains of the salt in a fl.drachm is desired, dilute the above with an equal measure of the elixir, or make by dissolving 640 grains of the salt in elixir sufficient to make a pint.

Elixir Potassium Bromide and Hydrated Chloral.

Elixir Bromide-Chloral.

Potassium Bromide,	2 ounces av.
Hydrated Chloral,	1 ounce av.
Elixir, sufficient to make	1 pint

Dissolve the salts in the elixir and filter. A fl.drachm contains 7 grains potassium bromide and $3\frac{1}{2}$ grains hydrated chloral. The dose is from 1 to 2 teaspoonfuls.

The combinations of potassium bromide and chloral hydrate, in the form of an elixir or solution, have been very popular, several proprietary preparations of this kind having had a large sale as hypnotics and sedatives; one quite popular with physicians is "Bromidia," prepared by Battle and Co., Chemists Corporation, St. Louis, Mo., which, according to their published statement, contains in each fl.drachm, 15 grains potassium bromide, 15 grains chloral hydrate, and $\frac{1}{8}$ grain each extracts Cannabis, Indica and Hyoscyamus. It is claimed that alcohol should not be used in making solutions of the salts named, on account of the chemical action which takes place.

Elixir Potassium Bromide Compound. Sedative Elixir.

Potassium Bromide,	640 grains
Morphine Sulphate,	8 grains
Ammonium Valerate,	256 grains
Ammonia Water,	90 minims
Syrup,	2 fl.ounces
Elixir, sufficient to make	1 pint

Dissolve the salts in the elixir and syrup; add the aqua ammonia, and color, if desired, with a little carmine solution and caramel, then filter. A fl.drachm contains 5 grains potassium bromide, 2 grains am-

monium valerate, and one-sixteenth grain morphine. The dose is a teaspoonful.

Elixir Potassium Iodide.

Potassium Iodide,	640 grains
Elixir, sufficient to make	1 pint

Dissolve the salt in the elixir. A fl.drachm contains 5 grains potassium iodide. The dose is a teaspoonful or more. Elixir Ammonium Iodide and Elixir Sodium Iodide are made in the same manner and proportion.

Elixir Propylamine Salicylate.

Salicylic Acid,	1 ounce av.
Propylamine, (liquid),	2 fl.drachms
Alcohol,	3 fl.ounces
Elixir, sufficient to make	1 pint

Rub the salicylic acid with the alcohol and elixir and add the propylamine, equivalent to 5 grains of the propylamine salicylate. The dose is a teaspoonful for rheumatic troubles.

Elixir "Protoxide" of Iron.

Solution "Protoxide" of Iron,	2 fl.ounces
Elixir,	14 fl.ounces

Mix them. A fl.drachm contains 2 grains iron protocitrate. The dose is a teaspoonful to a dessertspoonful.

Elixir "Protoxide" of Iron and Calcium Iodide.

Calcium Iodide,	128 grains
Elixir "Protoxide" of Iron,	1 pint

Dissolve the salt in the elixir. A fl.drachm contains 2 grains iron protocitrate, and 1 grain calcium iodide. The dose is a teaspoonful.

Elixir "Protoxide of Iron" and Potassium Iodide.

Potassium Iodide,	384 grains
Elixir "Protoxide of Iron,"	1 pint

Dissolve the salt in the elixir. A fl.drachm contains 2 grains iron protocitrate and 3 grains potassium iodide. The dose is a teaspoonful.

Elixir "Protoxide of Iron" and Quinine.

Quinine Sulphate,	128 grains
Elixir "Protoxide of Iron,"	1 pint

Dissolve the quinine salt by rubbing with separate portions of the elixir, and filter. A fl.drachm contains 2 grains iron protocitrate and 1 grain of quinine. The dose is a teaspoonful.

Elixir "Protoxide of Iron," Quinine and Strychnine.

Strychnine Sulphate,	1¼ grains
Elixir "Protoxide of Iron" and Quinine,	1 pint

Dissolve the strychnine salt by rubbing with separate portions of

the elixir, or add $1\frac{1}{4}$ fl.drachms of strychnine solution to a pint of the elixir. A fl.drachm contains 2 grains iron protocitrate, 1 grain of quinine and $\frac{1}{100}$ grain of strychnine sulphate. Dose, a teaspoonful.

Elixir Quinine.

Quinine Sulphate,	128 grains
Sulphuric Acid, q. s., about	10 minims
Elixir,	1 pint
Ammonia Water, q. s.,	10 minims

Rub the quinine salt to a powder and then with the elixir to a smooth mixture, add sulphuric acid, drop by drop, until, after standing, the quinine is entirely dissolved, then add a few drops ammonia water until the blue fluorescence of the solution has mostly disappeared, filter. A fl. drachm contains 1 grain of the quinine salt. The dose is a teaspoonful to a tablespoonful.

Elixir Quinine, Bismuth and Pepsin.

Elixir Quinine,	8 fl.ounces
Elixir Pepsin and Bismuth,	8 fl.ounces

Mix them, and if any cloudiness occurs, add ammonia water, drop by drop, to clear. A fl.drachm contains $\frac{1}{2}$ grain each, quinine and bismuth and 1 grain pepsin. The dose is a teaspoonful to a dessertspoonful.

Elixir Quinine, Bismuth and Strychnine.

Elixir Quinine,	8 fl.ounces
Elixir Bismuth and Strychnine,	8 fl.ounces

Mix them, and if necessary, add a few drops of ammonia water to make clear. A fl.drachm contains $\frac{1}{2}$ grain quinine, $\frac{1}{2}$ grain bismuth, and $\frac{1}{128}$ grain strychnine.

Elixir Quinine Bisulphate.

Quinine Bisulphate,	128 grains
Elixir,	1 pint

Rub the quinine salt with the elixir until dissolved, and filter. A fl.drachm contains 1 grain quinine bisulphate. The dose is a teaspoonful to a tablespoonful.

Elixir Quinine Bromide.

Quinine Bromide,	128 grains
Elixir,	1 pint

Dissolve the salt in the elixir, and filter. A fl.drachm contains 1 grain quinine bromide. The dose is a teaspoonful or more.

Elixir Quinine Phosphate.

Quinine Sulphate,	128 grains
Diluted Phosphoric Acid,	4 fl.drachms
Elixir,	1 pint

Rub the quinine salt to a fine powder, then to a smooth mixture with the elixir, add the phosphoric acid, dissolve and filter. A fl.drachm contains 1 grain of the quinine salt. The dose is a teaspoonful or more.

Elixir Quinine Valerate.

Quinine Valerate,	64 grains
Citric Acid,	10 grains
Elixir,	1 pint

Dissolve the valerate by rubbing to a fine powder, adding the citric acid and then rubbing with the elixir. A fl.drachm contains $\frac{1}{2}$ grain quinine valerate. The dose is a teaspoonful to a dessertspoonful.

Elixir Rhubarb.

Rhubarb, in coarse powder,	1½ ounce av.
Elixir Percolating Menstruum, q. s., about	1 pint
Sugar,	5 ounces av.
Soluble Elixir Flavoring,	1 fl.ounce

Make by percolation as directed. This may also be made by mixing 1½ ounces fluidextract of rhubarb with enough elixir to make a pint. A fl.drachm represents about 5 grains of rhubarb. The dose is a teaspoonful to a tablespoonful.

The Nat. Formulary gives the formula for this elixir:

Sweet Tincture of Rhubarb, (U. S. P.),	8 fl.ounces
Deodorized Alcohol,	1 fl.ounce
Water,	3 fl.ounces
Glycerin,	2 fl.ounces
Syrup,	2 fl.ounces

Mix and filter. A fl.drachm represents about 2½ grains of rhubarb.

The B. P. C. Formulary, 1901, directs:

Rhubarb Root, No. 12 powder,	5 ounces av.
Fennel Fruit, bruised,	2 ounces av.
Glycerin,	3 fl.ounces
Refined Sugar,	4 ounces av.
Alcohol (90%), 1 volume; Distilled Water, 3 volumes,	a sufficient quantity.

Make 15 fl.ounces of tincture by percolation and pressure and add to it the sugar and glycerin. A fl.drachm contains about 15 grains of rhubarb. Dose, 1 to 3 fl.drachms. This is about three times the strength of the first formula, and six times the strength of the Nat. Form. preparation.

Elixir Rhubarb and Columbo,

Fluidextract of Columbo,	256 minims
Fluidextract of Rhubarb,	256 minims
Elixir, sufficient to make	1 pint

Mix, and after standing, filter. This may also be made by percolating rhubarb and colombo, each 256 grains, with elixir percolating menstruum, 1 pint, adding 5 ounces sugar and 1 ounce soluble flavoring, and filtering. A fl.drachm represents 2 grains each, rhubarb and columbo. The dose is a teaspoonful to a dessertspoonful.

Elixir Rhubarb and Magnesia.

Two elixirs of rhubarb and magnesia are used, one containing magnesium sulphate (Epsom Salt) and the other magnesium citrate in solution. The former is probably the most used, but the latter is by far the more elegant preparation.

Made with Magnesium Sulphate.

Magnesium Sulphate, (Epsom Salt),	64 grains
Elixir Rhubarb,	15 fl.ounces

Rub the salts with the elixir until dissolved. The dose is a dessertspoonful to a tablespoonful.

Made with Magnesium Citrate.

Citric Acid,	3 drachms
Magnesium Carbonate,	2 drachms
Water,	1 fl.ounce
Elixir Rhubarb,	15 fl.ounces

Rub the magnesium carbonate with the water and gradually add the citric acid. When effervescence has ceased add the elixir rhubarb, and mix thoroughly. The dose is a dessertspoonful or more.

Elixir Rhubarb and Potassium Compound. Alkaline Elixir.

Rhubarb, in coarse powder,	160 grains
Potassium Bicarbonate,	160 grains
Cinnamon,	80 grains
Golden Seal,	80 grains
Elixir Percolating Menstruum,	1 pint
Sugar,	5 ounces av.
Spirit of Peppermint,	2 fl.drachms

Mix all together and macerate for several days, with occasional agitation, then filter, adding enough elixir through the filter to make a pint. In making larger quantities of this elixir it is best made by percolation as directed. This is of the same strength as the "Neutralizing Cordial" of the American Dispensatory. The dose is a dessertspoonful to a tablespoonful. Under the name "Alkaline Elixir" it has recently met with considerable favor with physicians.

Elixir Rubrum. Red Elixir.

As understood in American pharmacy, Red Elixir is simple elixir colored red with carmine coloring, cochineal or cudbear. The simple elixir is often designated as elixir album or "white elixir." Red elixir

may be used as a base for elixirs desired to be colored red, but in the formulas in this work the coloring is directed to be added to the elixir when made.

Elixir Salicylic Acid Compound.

An elixir by this name is prescribed for rheumatism. It is in reality an elixir of sodium salicylate comp.

Salicylic Acid,	1 ounce
Sodium Bicarbonate,	$\frac{3}{4}$ ounce
Wine of Colchicum,	2 fl.ounces
Syrup,	10 fl.ounces
Alcohol,	10 fl.ounces
Water,	10 fl.ounces
Essence of Wintergreen,	$\frac{1}{2}$ fl.ounce

In a bottle of double the capacity required mix the liquids and dissolve the sodium bicarbonate in the mixture, then add the salicylic acid gradually, stir occasionally until dissolved, and after standing 24 hours, filter. Dose, a dessertspoonful to a tablespoonful.

Another elixir bearing the same name but of entirely different composition is found on the market.

Salicylic Acid,	640 grains
Fluidextract Cimicifuga,	256 minims
Fluidextract Gelsemium,	256 minims
Potassium Iodide,	64 grains
Alcohol,	4 fl.ounces
Glycerin,	4 fl.ounces
Elixir, enough to make	1 pint

Mix, dissolve, and after standing, filter. Dose a teaspoonful.

Elixir Sarsaparilla Compound.

Fluidextract Sarsaparilla Compound,	4 fl.ounces
Elixir,	12 fl.ounces

Mix them. This elixir may also be made from the drugs directed for making fluidextract sarsaparilla compound by percolating the ingredients as directed under fluidextract of sarsaparilla compound with elixir percolating menstruum sufficient to make 52 fl.ounces, adding 20 ounces of sugar and 4 fl.ounces soluble flavoring to make 4 pints of elixir. This is of the same strength as syrup sarsaparilla compound. The dose is a teaspoonful or more.

Elixir Saw Palmetto Compound.

Fluidextract Saw Palmetto,	4 fl.ounces
Fluidextract Corn Silk,	4 fl.ounces
Fluidextract Triticum,	4 fl.ounces
Fluidextract Santal Wood,	1 fl.ounce
Elixir,	3 fl.ounces

Mix them. A fl.drachm represents 15 grains each fresh saw palmetto berries, corn silk and triticum, and $3\frac{3}{4}$ grains santal wood. The dose is a teaspoonful to a dessertspoonful.

Elixir Saw Palmetto and Coca Compound.

Fluidextract Coca,	2 fl.ounces
Fluidextract Pichi,	1 fl.ounce
Fluidextract Damiana,	1 fl.ounce
Fluidextract Kola Nut,	1 fl.ounce
Elixir Saw Palmetto Compound,	11 fl.ounces

Mix them. Dose, a teaspoonful to a dessertspoonful.

Elixir Saw Palmetto and Santal Compound.

Fluidextract Saw Palmetto,	4 fl.ounces
Fluidextract Santal Wood,	1 fl.ounce
Fluidextract Corn Silk,	4 fl.ounces
Elixir,	7 fl.ounces

Mix them. A fl.drachm represents about 15 grains each of fresh saw palmetto berries and corn silk, and $3\frac{3}{4}$ grains of santal wood. Dose, a teaspoonful to a dessertspoonful.

Elixir Scilla Compound. Elixir Squill Compound.

Squill, in coarse powder,	640 grains
Senega, in coarse powder,	640 grains
Antimony and Potassium Tartrate,	16 grains
Sugar,	5 ounces av.
Elixir Percolating Menstruum, q. s., about	18 fl.ounces
Soluble Elixir Flavoring,	1 fl.ounce

Make by percolation as directed. This is the same strength as syrup of squill compound. The dose is $\frac{1}{4}$ to 1 teaspoonful or more.

Elixir Senna.

Fluidextract of Senna,	$2\frac{3}{4}$ fl.ounces
Elixir, sufficient to make	1 pint

Mix, and after standing, filter. A fl.drachm represents 10 grains senna. The dose is a teaspoonful to a tablespoonful as a laxative.

The B. P. C. Formulary formula, slightly modified, is as follows:

Fluidextract Alexandrian Senna,	16 fl.ounces
Chloroform,	24 minims
Oil of Coriander,	$2\frac{1}{2}$ minims
Tincture Capsicum,	30 minims
Alcohol,	3 fl.drachms
Elixir, sufficient to make	20 fl.ounces

Elixir Senna Compound.

Senna Leaves, in coarse powder,	2	ounces av.
Rhubarb, in coarse powder,	1	ounce av.
Jalap, in coarse powder,	$\frac{1}{2}$	ounce av.
Mandrake, in coarse powder,	$\frac{1}{2}$	ounce av.
Elixir Percolating Menstruum, q. s., about	18	fl.ounces
Sugar,	5	ounces av.
Soluble Elixir Flavoring,	1	fl.ounce

Make by percolation as directed. The dose is a teaspoonful to a dessertspoonful as a laxative, a tablespoonful as a cathartic.

Elixir Sodium Bromide.

Sodium Bromide,	1280	grains
Elixir, sufficient to make		1 pint

Dissolve the salt in the elixir and filter. A fl.drachm contains 10 grains sodium bromide. Dose, a teaspoonful to a tablespoonful.

An elixir containing 5 grains of the salt in a fl.drachm may be made by diluting this one half with simple elixir, or by dissolving 640 grains of the salt in enough of the elixir to make a pint.

Elixir Sodium Salicylate.

Sodium Salicylate,	640	grains
Elixir, sufficient to make		1 pint

Dissolve the salt in the elixir and filter. This elixir may also be made by mixing 400 grains of salicylic acid with 300 grains sodium bicarbonate and dissolving the mixture in a pint of elixir in a capacious vessel. When effervescence is over, filter. A fl.drachm contains 5 grains sodium salicylate. The dose is a teaspoonful to a dessertspoonful or more for rheumatic affections.

Elixir Stillingia.

Fluidextract Stillingia,	$2\frac{3}{4}$	ounces av.
Alcohol,	2	fl.ounces
Elixir, sufficient to make	1	pint

Mix them, and after standing, filter. This may also be made by percolating $2\frac{3}{4}$ ounces stillingia with 2 ounces alcohol and 14 ounces percolating menstruum, adding 5 ounces of sugar and 1 ounce soluble flavoring. A fl.drachm represents 10 grains stillingia. The dose is a teaspoonful or more.

Elixir Stillingia Compound.

Fluidextract Stillingia Compound,	4	fl.ounces
Elixir,	12	fl.ounces

Mix them, and after standing, filter. This may also be made by percolating the drugs as directed for making 1 pint fluidextract stillingia compound with elixir percolating menstruum until 52 fl.ounces have passed, then dissolving 20 ounces av. of sugar in the percolate and add-

ing 4 fl.ounces soluble flavoring to make 4 pints elixir. This is the same strength as syrup stillingia compound. The dose is a teaspoonful to a dessertspoonful. Owing to the greater solubility of the active principles of stillingia in an alcoholic than an aqueous menstruum, the elixir is to be preferred to the syrup.

Elixirs of Strontium Salts.

There has recently been some demand for elixirs of strontium salts. Bromide of strontium is useful in diabetes and catarrhal conditions of the stomach and intestines. Iodide of strontium presents a form of administering iodine very free from irritation to the mucous membrane. Lactate of strontium is recommended for rheumatism and gout. The following general formula for elixirs of strontium salts will suffice:

The Strontium Salt,	640 grains
Elixir, sufficient to make	16 fl.ounces

Dissolve and filter if required. A fl.drachm contains 5 grains of the strontium salt. The dose is a teaspoonful to a dessertspoonful.

Elixir Strontium Salicylate Compound.

Strontium Salicylate,	256 grains
Strontium Iodide,	128 grains
Wine of Colchicum,	640 minims
Tincture of Gelsemium,	256 minims
Elixir, sufficient to make	1 pint

Dissolve the strontium salts in 12 fl.ounces of elixir, add the wine of colchicum and enough elixir to make the measure 16 fl.ounces. Dose a teaspoonful to a dessertspoonful.

Elixir Strychnine.

Strychnine Sulphate,	4 grains
Elixir,	1 pint

Dissolve the strychnine salt by rubbing with separate portions of the elixir, and adding a few drops of dilute sulphuric acid, or add 4 fl.drachms solution strychnine sulphate to a pint of the elixir and filter. A fl.drachm contains $\frac{1}{32}$ grain strychnine sulphate. The dose is from $\frac{1}{2}$ to a teaspoonful. This elixir is also made containing only 2 grains in a pint, or $\frac{1}{64}$ grain in a fl.drachm.

Elixir Strychnine Valerate.

Strychnine Valerate,	2 grains
Elixir,	1 pint

Rub the strychnine salt with separate portions of the elixir until dissolved. A fl.drachm contains $\frac{1}{64}$ grain strychnine valerate. The dose is a teaspoonful.

Elixir Sumbul. Elixir of Musk Root.

Sumbul, or Musk Root,	1280 grains
Elixir Percolating Menstruum, q. s., about	1 pint
Sugar,	5 ounces av.
Soluble Elixir Flavoring,	1 fl.ounce

Make by percolation as directed, or mix $2\frac{3}{4}$ fl.ounces of fluidextract of sumbul with enough elixir to make a pint, and filter. A fl.drachm represents 10 grains of sumbul. The dose is a teaspoonful or more.

Elixir Sumbul Compound. Compound Elixir of Musk Root.

Ammonium Valerate,	128 grains
Elixir Sumbul,	1 pint

Dissolve the salt in the elixir and filter. A fl.drachm represents 10 grains musk root and 1 grain ammonium valerate. The dose is a teaspoonful to a dessertspoonful as a nervine. This elixir is also called "Elixir Sumbul and Ammonium Valerate."

Elixir Taraxacum Compound.

The formulas for this elixir are given under the heading Elixir Dandelion Compound, which see. The formula was first given for this elixir by Prof. P. C. Candidus, of Mobile, and as this particular formula is still frequently called for, it is here repeated in substance:

Dandelion Root,	1 ounce av.
Wild Cherry Bark,	$\frac{3}{4}$ ounce av.
Gentian Root,	$\frac{1}{8}$ ounce av.
Bitter Orange Peel,	$\frac{1}{4}$ ounce av.
Cinnamon,	$\frac{1}{8}$ ounce av.
Licorice Root,	$\frac{1}{2}$ ounce av.
Star Anise,	30 grains
Caraway Seed,	30 grains
Coriander Seed,	30 grains
Elixir Percolating Menstruum, q. s., about	18 fl.ounces
Sugar,	5 ounces av.

Grind the drugs to a coarse powder, and make by percolation as directed. This elixir is used as a vehicle for quinine, and as an addition to other medicines. Also as a laxative and tonic in doses of a dessertspoonful or more.

Elixir Terpin Hydrate.

Terpin Hydrate,	128 grains
Alcohol,	1 fl.ounce
Elixir,	15 fl.ounces

Put the terpin hydrate in a 4 oz. bottle with the alcohol and heat to about 160°F. on a water-bath, shaking occasionally until it is dissolved, then add to the elixir previously warmed to about 120°F. A fl.drachm contains 1 grain terpin hydrate. Dose, a teaspoonful.

Elixir Terpin Hydrate and Codeine.

Codeine,	16 grains
Elixir Terpin,	1 pint

Dissolve. A fl.drachm contains 1 grain terpin hydrate and $\frac{1}{8}$ grain codeine. Dose, a teaspoonful.

Elixirs Terpin Hydrate Compound.

Any number of combinations of terpin hydrate with other elixirs may be made as desired by dissolving 128 grains in 1 ounce of alcohol as is directed under Elixir of Terpin Hydrate, and adding to 15 ounces of the desired elixir. It is much used in cough medicines.

Elixir Valerian.

Valerian Root, in coarse powder,	1280 grains
Elixir Percolating Menstruum, q. s., about	1 pint
Sugar,	5 ounces av.
Soluble Elixir Flavoring,	1 fl.ounce

Make by percolation as directed. This also may be made by mixing $2\frac{3}{4}$ fl.ounces of fluidextract of valerian with enough elixir to make a pint, and, after standing, filter. A fl.drachm represents 10 grains valerian. The dose is a teaspoonful to a dessertspoonful or more.

Elixir Veratrum Viride.

American Hellebore, in fine powder,	256 grains
Elixir,	1 pint

Macerate for five days, and filter. This may also be made by adding 256 minims of fluidextract veratrum viride to enough elixir to make a pint. A fl.drachm represents 2 grains veratrum viride. The dose is $\frac{1}{2}$ to 1 teaspoonful.

Elixir Viburnum Compound. Compound Elixir of Cramp Bark.

The National Formulary gives the following:

Fluidextract Viburnum Opulus,	1 $\frac{1}{4}$ fl.ounces
Fluidextract Trillium,	2 $\frac{1}{2}$ fl.ounces
Fluidextract Aletris,	1 $\frac{1}{4}$ fl.ounces
Compound Elixir Taraxacum,	11 fl.ounces

Mix and allow to stand a few days, and filter. Dose, a teaspoonful to a dessertspoonful.

Elixir Viburnum Prunifolium. Elixir of Black Haw.

The following is from the National Formulary:

Fluidextract Black Haw,	2 fl.ounces
Compound Tincture of Cardamom,	1 fl.ounce
Aromatic Elixir,	13 fl.ounces

Mix them, allow to stand for a few days, and filter.

Elixir Wild Cherry.

Wild Cherry Bark, in coarse powder,	2¾ ounces av.
Elixir Percolating Menstruum, q. s., about	1 pint
Sugar,	5 ounces av.
Soluble Elixir Flavoring,	1 fl.ounce

Make by percolation as directed. This may also be made by mixing 2¾ fl.ounces of fluidextract of wild cherry with enough elixir to make a pint. A fl.drachm represents 10 grains of wild cherry. The dose is a teaspoonful or two.

Elixir Wild Cherry. Detannated.

Wild Cherry Bark, in coarse powder,	2¾ ounces av.
Elixir Percolating Menstruum, q. s., about	1 pint
Sugar,	5 ounces av.
Soluble Elixir Flavoring,	1 fl.ounce

Make by percolation as directed, and detannate with ferric hydrate as directed. This elixir is used with solutions of iron salts, bismuth etc., that would form inky colors or precipitates with the former formula.

Elixir Wild Cherry, from Cherry Pitts.

An elixir may be made from cherry pits, which does not need to be detannated to combine with iron etc., by macerating 2 ounces of crushed cherry pits with a pint of elixir, for several days, and filtering.

Elixir Wild Cherry, Ferrated.

Iron and Ammonium Citrate,	128 grains
Elixir Wild Cherry, detannated,	1 pint

Dissolve the iron salt by rubbing with separate portions of the elixir. A fl.drachm represents 10 grains of wild cherry and 1 grain of iron citrate. The dose is a teaspoonful to a dessertspoonful.

Elixir Wild Cherry, Ferriphosphated.

Soluble Iron Phosphate,	128 grains
Water,	1 fl.ounce
Elixir Wild Cherry, detannated,	15 fl.ounces

Dissolve the iron salt in the water by the aid of heat and add the elixir to the solution. A fl.drachm represents 10 grains of wild cherry and 1 grain iron phosphate. Dose, a teaspoonful to a dessertspoonful.

Elixir Wild Cherry, Ferrophosphated.

Iron Pyrophosphate,	128 grains
Water,	1 fl.ounce
Elixir Wild Cherry, detannated,	15 fl.ounces

Dissolve the iron salt in the water, by the aid of heat, and add the elixir to the solution. A fl.drachm represents 10 grains wild cherry

and 1 grain iron pyrophosphate. Dose, a teaspoonful to a dessert-spoonful. This elixir of wild cherry and iron may be combined with bismuth, strychnine and other soluble salts, with which it is compatible.

Elixir Wild Cherry Compound.

Wild Cherry Bark,	1 ounce av.
Marshmallow Root,	$\frac{1}{2}$ ounce av.
Licorice Root,	$\frac{1}{2}$ ounce av.
Elixir Percolating Menstruum, q. s., about	1 pint
Sugar,	5 ounces av.
Soluble Elixir Flavoring,	1 fl.ounce

Make by percolation as directed. This elixir is used chiefly as a vehicle for quinine, for which it is excellent. It may be made by maceration instead of percolation, if desired, and is a better way.

Elixir Yerba Santa.

Fluidextract Yerba Santa,	$2\frac{3}{4}$ fl.ounces
Alcohol,	2 fl.ounces
Elixir, sufficient to make	1 pint

Mix, and after standing, filter. A fl.drachm represents 10 grains yerba santa. The dose is a teaspoonful or more.

Elixir Yerba Santa Compound. Elixir Corrigen.

The following formula is adapted from the original first published by Mr. J. S. McClary, of Los Angeles, Cal., who first brought to notice the advantages of yerba santa as a carrier for quinine:

Yerba Santa,	6 ounces av.
Orange Peel,	2 ounces av.
Cinnamon Bark, Cloves, Cardamom Seeds, of each,	3 drachms
Coriander Seed, Caraway Seed, Anise Seed, of each,	2 drachms
Glycerin,	1 pint
Alcohol,	$\frac{1}{2}$ pint
Sugar,	4 pounds
Water, sufficient to make	1 gallon

Powder the drugs coarsely, and, having mixed the alcohol and glycerin, moisten the powder and pack in the percolator, adding water through the percolator, and continuing the percolation until 6 pints of percolate are obtained. In this dissolve the sugar by gentle heat, and strain.

This elixir is used mainly to disguise the taste of quinine and other bitter medicines. The following formula may be considered an improvement, and is much more readily prepared:

Fluidextract Yerba Santa,	4	ounces
Fluidextract Licorice,	2	ounces
Tincture Fresh Orange Peel,	2	ounces
Magnesium Carbonate,	$\frac{1}{2}$	ounce
Elixir, sufficient to make	4	pints

Rub the fluidextracts and the tincture in a mortar with the magnesium carbonate and gradually add the elixir, then filter through paper. This is an excellent vehicle for quinine and other bitter powders.

Elixir Zinc Valerate.

Zinc Valerate,	64	grains
Elixir,	1	pint

Dissolve the salt by rubbing with the elixir. A fl.drachm contains $\frac{1}{2}$ grain zinc valerate. The dose is a teaspoonful or more.

Other Elixirs.

In the first part of this article it was explained that elixirs, as understood in American pharmacy, were flavored, sweetened, weakly alcoholic preparations, in which medicinal substances are exhibited in pleasant, palatable form etc. The foregoing formulæ have corresponded to this description, but there are many preparations which have been known in the past as "elixirs," which are not of this class, and which could not be properly included in it. The formulæ for such of these as are most important, or likely to be called for, are therefore given here. Many of them are or have been official in foreign pharmacopœias.

Elixir Anti-Dyspeptic. **Elixir Digesticum.** Pepsin 64 grains, pancreatin 128 grains, fl.extract cascara 64 minims, fl.extract ipecac 13 minims, strychnine sulphate 1 grain, elixir 16 fl.ounces. Mix, dissolve.

Elixir Antogoutteux de Villette. **Gout Elixir.** Cinchona bark 4 parts, poppy petals 2 parts, sassafras 1 part, guaiacum 2 parts, rum 160 parts, syrup sarsaparilla 100 parts. Macerate and filter.

Elixir Anti-Rheumatic. A number of elixirs are known in some localities by this name. Perhaps the best one is Elixir Salicylic Acid Compound, which see.

Elixir Calmans. **Elixir Calmant.** Fr. Aloes, orange peel, gentian, rhubarb, each, 20 parts; saffron 5 parts, alcohol (60%) 640 parts, conserve of opium 30 parts, extract of white poppy 30 parts. Macerate for several days and express and filter, then add to the filtrate ether, sp. gr. 0.735, 60 parts, and mix them thoroughly.

Elixir Carminative, Dalby's. Tincture of opium $2\frac{1}{4}$ fl.ounces, tincture asafetida $1\frac{1}{4}$ fl.ounces, essence of caraway $\frac{1}{2}$ ounce, essence of peppermint 1 ounce, calcined magnesia $\frac{1}{2}$ ounce, tincture of castor $3\frac{3}{4}$ ounces, alcohol 4 fl.ounces, syrup 30 fl.ounces; mix.

Clauder's Elixir. Elixir Aperitivum. (Pideret). Salt of tartar, ammonium chloride, aloes and myrrh, 1 ounce; elder-flower water 25 fl.ounces. Digest with agitation for 24 hours and filter.

(Parish). Potassium carbonate 1 ounce, guaiacum, myrrh, saffron and rhubarb, of each, 2 drachms; water 18 fl.ounces. Macerate a few days and decant.

Elixir Cardiac Stimulant. Tincture digitalis, tincture strophanthus, tincture cactus grandiflora, each, 320 minims; strychnine nitrate 2 grains, nitroglycerin $13/20$ grain, elixir sufficient to make 16 fl.ounces. Mix.

Elixir Deslaurier's. Tonic febrifuge, au Quinquina et Caffé. Yellow cinchona bark $2\frac{1}{2}$ ounces, brown cinchona bark 1 ounce, coffee, slightly roasted, 2 ounces; sugar $12\frac{1}{2}$ ounces, sherry wine 2 pints, citric acid 150 grains. Powder the drugs, macerate 7 days, filter and dissolve the sugar in the filtrate.

Elixir Emmenagogue. Purified aloes 182 grains, rue, savin and safflower, each, 92 grains, elixir 1 pint. Macerate for 7 days and filter.

Elixir de Garus. Myrrh 90 grains, aloes 90 grains, cloves 180 grains, nutmeg 180 grains, saffron 480 grains, cinnamon 360 grains, alcohol 12 pints. Reduce the drugs to a coarse powder, macerate with the alcohol and distil 9 pints, which reserve; then take maidenhair 4 tr.ounces, liquorice root $\frac{1}{2}$ tr.ounce, figs 3 tr.ounces. Infuse in 8 pints of boiling water, strain, express and dissolve in the liquid 12 pounds av. of sugar; mix equal parts by weight of the syrup thus prepared with the distilled spirit reserved.

Elixir of Gold. Terchloride of gold 20 grains, alcohol 6 fl.drachms, ether 3 fl.drachms.

Dr. De la Motte's Golden Drops are also furnished under the name Elixir of Gold; chloride of iron 1 part, alcohol 3 parts, ether 3 parts.

Elixir Migraine. Acetanilide 256 grains, sodium bromide 640 grains, caffeine 32 grains, elixir sufficient to make 1 pint. Mix and dissolve.

Elixir Pectoral. Balsam tolu 2 ounces, benzoin $1\frac{1}{2}$ ounces, saffron $\frac{1}{2}$ ounce, alcohol 32 fl.ounces. Digest by gentle heat for 4 days, filter.

Elixir Salutis. Elixir of Health. Daffy's Elixir. This elixir was formerly official under the title Tincture Senna Compound. Many formulas for it are extant. The following is from the Edinburgh Dispensatory: Senna 2 tr.ounces, jalap 1 tr.ounce, coriander $\frac{1}{2}$ tr.ounce, diluted alcohol $3\frac{1}{2}$ pints. Macerate and filter. To this 1 pound of sugar and other aromatics may be added if desired.

Elixir Stoughton's. (Codex). Aloes and cascarilla, of each, 1 drachm; rhubarb 3 drachms, gentian, germander, wormwood and bitter orange peel, of each, 5 drachms; alcohol (60° proof), 2 pints. Macerate and filter.

Elixir Tonic. A number of old preparations are known by this name, as Elixir Roborans or Tincture Crown Bark, for which compound tincture of cinchona may be dispensed if called for.

Besides the elixirs of the kind mentioned, are several which are or have been official in the U. S. P. under other names, as Elixir Proprietatis (Tincture Aloes and Myrrh), Elixir Vitriol (Aromatic Sulphuric Acid), McMunn's Elixir of Opium (Deodorized Tincture of Opium), Elixir Paregoric etc. There are also many not of sufficient general importance to require a formula for their preparation. They may usually be prepared as wanted by intelligent druggists.

EMPLASTRA — PLASTERS.

As understood in pharmacy in this country, plasters are either masses, usually made up in the form of rolls or plasters already spread on paper, cloth or leather. In foreign pharmacy the name "Emplastrum" or "Plasters" is given to the mass, and the spread plasters are called Emplastrum Extensa or Sparadraps, the foreign names for the latter being Sparadraps, Fr.; Espadrapos, Mex., Sp.; Esparadraps, Port. Among the latter are included those spread from a plaster mass and those made by brushing the liquified gelatinous substance on cloth with a brush, generally known as "Court Plaster" or "Adhesive Plaster."

The making and spreading of plasters, which was formerly quite an important feature of the business of the apothecary, is now nearly a lost art as far as the retail druggist is concerned, the business having been relegated to manufacturers who have experience and suitable machinery for the work, and who furnish all the necessary combinations in the plaster line. In this country several large establishments are devoted entirely to the manufacture of plasters, and from long experimenting and experience have perfected their products to a high degree. It is not therefore supposed that many druggists will attempt to make spread plasters which are regularly furnished by manufacturers, but only such plaster masses as are occasionally used in making other preparations, or sometimes called for in old formulas, or special plasters which they may be required to make.

For spreading plasters in a small way the plaster iron is generally used. Plaster spreading machines are advertised, but they are not adapted for the use of retail druggists.

The following formulæ for plasters embrace those of the most importance in pharmacy, most of which are or have been official.

EMPLASTRUM ADHESIVUM. U. S. Adhesive Plaster.

Emplastrum Resinæ. Br. Resin Plaster. Adhesive Plaster.

The U. S. formula is:

Rubber, cut in small pieces,	20 Gm. or	¾ ounce
Petrolatum,	20 Gm. or	¾ ounce
Lead Plaster,	960 Gm. or	12 ounces
To make	1000 Gm. or	12½ ounces

"Melt the rubber at a temperature not exceeding 150°C. (302°F.); add the petrolatum and continue the heat until the rubber is dissolved. Add the lead plaster to the hot mixture; continue the heat until it becomes liquid, then strain, allow it to cool, and stir until it stiffens." <U. S.

For the Br. see *Emplastrum Resinæ*.

EMPLASTRUM AMMONIACI CUM HYDRARGYRO. Br.

Ammoniacum and Mercury Plaster.

The Br. formula is:

Ammoniacum,	12 ounces or 328	Gm.
Mercury,	3 ounces or 82	Gm.
Olive Oil,	56 grains or 3½	Gm.
Sublimated Sulphur,	8 grains or ½	Gm.

"Heat the olive oil; add the sulphur to it gradually, stirring until they are uniformly blended; with the mixture triturate the mercury until metallic globules are no longer visible; add the ammoniacum previously purified by boiling with successive portions of water, passing the resulting emulsions through, while rubbing the residues on a hair cloth sieve, and after mixing, evaporating the emulsions to a suitable consistence." <Br.

EMPLASTRUM BELLADONNÆ. U. S., Br.

Belladonna Plaster.

The U. S. P. formula is:

Extract of Belladonna Leaves,	300 Gm. or 3 ounces
Adhesive Plaster,	700 Gm. or 7 ounces
To make about	1000 Cc. or 10 ounces

"Melt the adhesive plaster on a water-bath, add it to the extract of belladonna leaves, softened by the heat of a water-bath, and continue the heat, stirring constantly until the mixture is perfectly homogeneous; then allow it to cool." <U. S.

"Spread Belladonna Plaster, made with a rubber base should yield, when assayed by the process given, not less than 0.38 percent., nor more than 0.42 percent. of mydriatic alkaloids." <U. S.

The Br. P. formula is

Liquid Extract of Belladonna,	
(from the root),	100 Cc. or 4 fl.ounces
Resin Plaster,	125 Gm. or 5 ounces

"Evaporate the liquid extract of belladonna on a water-bath until it is reduced in weight to 25 Gm. (or 1 ounce); add the resin plaster, previously melted; mix. This plaster contains 0.5 percent. of the alkaloids of belladonna root." <Br.

EMPLASTRUM CALEFACIENS. Br. Warming Plaster.

Cantharides, in coarse powder,	100 Gm. or 4 ounces
Yellow Beeswax,	100 Gm. or 4 ounces
Resin,	100 Gm. or 4 ounces
Soap Plaster,	800 Gm. or 2 pounds
Distilled Water,	500 Cc. or 20 ounces

"Infuse the cantharides in the distilled water for 6 hours; squeeze strongly through calico; then evaporate the expressed liquid on a water-bath until reduced to one-third; add the other ingredients; melt on a water-bath; stir until the ingredients are thoroughly mixed." < Br.

EMPLASTRUM CANTHARIDIS. Br. Cantharides Plaster.

In the U. S. P. this is classed among the cerates, as "Ceratum Cantharidis," which see. The Br. P. formula for Emplastrum Cantharidis is as follows:

Cantharides, in powder,	35 Gm. or 3½ ounces
Yellow Beeswax,	20 Gm. or 2 ounces.
Lard,	20 Gm. or 2 ounces
Resin,	20 Gm. or 2 ounces
Soap Plaster,	5 Gm. or ½ ounce

"Melt the resin; add the soap plaster, and afterwards the yellow beeswax and lard, sprinkle the cantharides into the melted mixture; stir continuously while the product is cooling." < Br.

EMPLASTRUM CAPSICI. U. S. Capsicum Plaster.

The U. S. official formula for this plaster is

Oleo-resin of Capsicum,	0.25 Gm. or 4 grains
Adhesive Plaster, (spread on fabric),	a sufficient quantity.

"Apply the oleo-resin of capsicum to the surface of the adhesive plaster by means of a brush, so as to form a thin coating over an area fifteen centimeters square, leaving a margin around the sides." < U. S.

EMPLASTRUM HYDRARGYRI. U. S., Br. Mercurial Plaster.

The U. S. formula is

Mercury,	30 Gm. or 480 grains
Oleate of Mercury,	1 Gm. or 16 grains
Hydrous Wool-Fat,	10 Gm. or 160 grains
Lead Plaster,	59 Gm. or 948 grains
To make	100 Gm. or 1600 grains

"Triturate the mercury with the oleate of mercury until the former is thoroughly divided, then add the hydrous wool-fat, and continue the trituration until globules of mercury are no longer visible. Add the mixture to the lead plaster, which has previously been melted in a

tared dish, and incorporate thoroughly, adding, if necessary, sufficient lead plaster to make the product weigh 100 grammes (or 1600 grains). "<U. S.

The Br. formula is

Mercury,	82 Gm. or 3 ounces
Sublimed Sulphur,	0.5 Gm. or 8 grains
Olive Oil,	3.5 Gm. or 56 grains
Lead Plaster,	164 Gm. or 6 ounces

"Heat the olive oil, add the sulphur to it gradually, stir until they are uniformly blended; with this mixture triturate the mercury until the metallic globules are no longer visible; add the lead plaster, previously melted; mix." <Br.

EMPLASTRUM ICHTHYOCOLLÆ.

Isinglass Plaster. Court Plaster.

This was official in the 7th revision of the U. S. P., but has been dismissed.

Prepare by dissolving 10 Gm. or parts ichthyocolla in enough hot water to make 120 Gm. or parts; one half of this solution is then spread in successive layers with a brush upon taffeta stretched on a level surface. The remainder of the solution is then mixed with 40 Gm. or parts of alcohol and 1 Gm. or part of glycerin, and the taffeta is again varnished with the solution as before. To make water-proof, varnish the back side of the taffeta with tincture of benzoin.

This method of preparing court plaster is similar to that used by manufacturers, except that the fresh fish-sounds are generally used for making the solution and that the taffeta is usually brushed over with the solution a number of times. Manufacturers have machinery by which the solution can be more evenly spread. Court plaster is made in various colors by coloring the solutions. It is also made on silk, thin muslin and paper. For the retail trade it is put up in small packages containing different colored sheets, and sold as "court plaster." For physicians use it is furnished in yard rolls.

EMPLASTRUM MENTHOL. Br. Menthol Plaster.

Menthol,	30 Gm. or 1½ ounces
Yellow Beeswax,	20 Gm. or 1 ounce
Resin,	150 Gm. or 7½ ounces

"Melt the beeswax and resin together and when the mixture approaches the temperature of 160° or 170°F. (71.1° or 76.7°C.), stir in the menthol until dissolved." <Br.

EMPLASTRUM OPII. U. S., Br. Opium Plaster.

The U. S. formula is

Extract of Opium,	6 Gm. or 90 grains
Water,	8 Cc. or 120 grains
Adhesive Plaster,	100 Gm. or 1560 grains

"Rub the extract of opium with the water until it is uniformly soft; add it to the adhesive plaster, which has been previously melted in a tared dish on a water-bath, and continue the heat with constant stirring until the product weighs 100 Gm. (or 1560 grains)." <U. S.

The Br. formula is:

Opium, in very fine powder,	10 Gm. or 1 ounce
Resin Plaster,	90 Gm. or 9 ounces

"Melt the resin plaster on a water-bath; stir in the opium gradually." <Br.

EMPLASTRUM PICIS. Br. Pitch Plaster.

The Br. gives the following formula. There is no corresponding U. S. formula:

Burgundy Pitch,	520 Gm. or 26 ounces
Frankincense,	260 Gm. or 13 ounces
Resin,	90 Gm. or 4½ ounces
Yellow Wax,	90 Gm. or 4½ ounces
Olive Oil,	40 Gm. or 2 ounces
Water,	40 Cc. or 2 ounces

"Add the oil and water to the frankincense, Burgundy pitch, resin and wax, previously melted together; then evaporate, constantly stirring, to a proper consistence." <Br.

EMPLASTRUM PLUMBI. U. S., Br. Lead Plaster.

The U. S. formula is

Soap, dried and in coarse powder,	100 Gm. or 10 ounces
Lead Acetate,	60 Gm. or 6 ounces
Water,	a sufficient quantity.

"Dissolve the soap in 350 Cc. (or 35 ounces) of hot water and strain the solution. Dissolve the lead acetate in 250 Cc. (or 25 ounces) of hot water, and at once filter the solution, stirring constantly. When the precipitate has subsided, decant the liquid, and wash the precipitate thoroughly with hot water. Transfer the mass to a warm slab, kneading it thoroughly to free it from water. Finally, roll the plaster into cylindrical forms and wrap them in paraffined paper." <U. S.

The Br. formula is

Lead Oxide,	400 Gm. or 1 pound
Olive Oil,	800 Gm. or 2 pounds
Distilled Water,	40 Cc. or 16 fl.ounces
	or a sufficient quantity.

"Boil all the ingredients together gently by the aid of a steam-bath; keep them simmering for four or five hours constantly until the product acquires a proper consistence for a plaster; add more of the distilled water during the process, if necessary." <Br.

EMPLASTRUM PLUMBI IODIDI. Br. Lead Iodide Plaster.

Lead Iodide,	50 Gm. or 2 ounces av.
Lead Plaster,	400 Gm. or 1 pound
Resin,	50 Gm. or 2 ounces av.

"Finely powder the iodide of lead; mix it with the lead plaster and resin previously melted together at as low a temperature as possible." <Br.

EMPLASTRUM RESINÆ. Br. Resin Plaster. Adhesive Plaster.

This is the "adhesive plaster" which, when spread, is used so extensively in surgery. Druggists are familiar with the spread plaster, but are little acquainted with the plaster mass.

The Br. formula is

Resin,	100 Gm. or 4 ounces
Lead Plaster,	800 Gm. or 2 pounds
Hard Soap,	50 Gm. or 2 ounces

"Melt each ingredient separately at a low temperature and mix." <Br.

EMPLASTRUM SAPONIS. U. S., Br. Soap Plaster.

The U. S. formula is

Soap, dried and in coarse powder,	10 Gm. or 1 ounce
Lead Plaster,	90 Gm. or 9 ounces
Water, sufficient to make	100 Gm. or 10 ounces

"Rub the soap with enough water to reduce it to a semi-liquid state; then mix it with the lead plaster, previously melted, and evaporate it to the proper consistence." <U. S.

The Br. formula is

Hard Soap,	150 Gm. or 6 ounces
Lead Plaster,	900 Gm. or 2¼ pounds
Resin,	25 Gm. or 1 ounce

"Melt the ingredients separately at a low temperature; mix; evaporate with constant stirring to a proper consistence." <Br.

Other Plasters.

The official U. S. and Br. plasters, for which formulas have been given, embrace most that are used to any extent in pharmacy; but a few others deserve attention and are therefore given here:

Antimonial Plaster. This is best prepared extemporaneously by sprinkling tartar emetic in very fine powder on the surface of common adhesive plaster, or any kind of spread plasters. It is used as a counter-irritant.

Camphor Plaster. For extemporaneous work camphor in fine powder or a strong solution of camphor in alcohol may be applied to the warmed surface of adhesive or other spread plasters. Several plasters containing camphor are official in foreign pharmacopœias.

Cancer Plaster. Several plasters are furnished for the purpose of removing cancers. The one to which the greatest success is attributed is used by some of the most noted cancer doctors. Sheep-sorrel is gathered green and pounded to a pulp, the juice is expressed and dried on pewter plates to an extract; this is then used as a plaster, or combined with some sort of adhesive salve and applied. Another cancer plaster is made with extract of hemlock 1 drachm, arsenious acid, in very fine powder, 30 grains; wax plaster 1 ounce.

Many other cancer plasters are used, most of them consisting of arsenic combined with other substances.

Corn Plaster. A great variety of corn plasters are found in the market, the most popular being made of felt coated with adhesive plaster, and a hole punched through the center to relieve the pressure from the corn. These may be made medicinal, but their chief action is to remove the pressure from the corn.

To apply to the corn in the form of a plaster, the following will be found effective:

Salicylic acid 60 grains, beeswax 6 drachms, Venice turpentine 2 drachms, verdigris, in fine powder, 60 grains. Melt the wax, add the Venice turpentine and mix in the other ingredients.

EMPYROFORM.

Empyroform. This is a condensation product of birch tar and formaldehyde. It is a grayish-brown powder, nearly odorless, insoluble in water but soluble in chloroform and fats. It is used instead of tar in skin diseases in the form of ointments and liniments, also in the form of soap, 5 to 10 percent.

EMULSA — EMULSIONS.

Emulsions are preparations in which an oil, gum, oleo-resin, liquid-resin, balsam or other fluid fatty or resinous matter is made to combine with water or aqueous solutions by means of some substance which unites with it to form a homogeneous mixture in which the globules of oil or other substance are so broken up or divided as to be invisible except by a magnifying glass or microscope. To fulfil the required conditions, an emulsion must be of a uniform consistence, permanent without separation, miscible in all proportions in water, syrup or aqueous liquids, and sufficiently fluid to be poured readily from a bottle. To make such an emulsion it is necessary to use the proper emulsifying ingredients in the proper proportions and to combine them in the proper manner, all of which requires an understanding of the methods of making emulsions and care in preparing them.

In medicine emulsions are employed to render many nauseating medicines palatable, and by minutely dividing the globules of oil etc., fitting them for digestion. They are mainly employed as nutritive food in debilitated conditions.

Emulsification is the process of making emulsions, which may be briefly described as follows:

General Directions for Preparing Emulsions.

To prepare emulsions in a small way, choose a shallow-shaped mortar that will hold double the quantity of the emulsion desired to be made, and a pestle with a large flattened head. See that the mortar and pestle are perfectly dry, then put the powdered gum arabic in the mortar, and gradually add the water, rubbing it to a smooth paste; or if the acacia mucilage syrup is used, rub it with the pestle around the sides of the mortar. Then begin to add the oil by pouring it very slowly from a bottle into the center of the gum solution, constantly rubbing it with the pestle with a circular motion around the sides of the mortar. This will form a thick pasty mass, which should get thicker as more oil is added. If the oil does not combine as rapidly as added, stop pouring for a moment and work the mass with the pestle until it is homogeneous. The oil should be added more slowly as the process proceeds, and care must be used to maintain a coating of the pasty mass on the sides of the mortar and on the pestle, the oil being broken up and emulsified between the two clinging surfaces thus presented. When all the oil is added, the mass should be white and of a thick pasty consistence, having no globules of oil visible. The flavoring oils should then be added, the glycerin or syrup incorporated with the mass by rubbing them together, and the water, to which is added any salts or solutions that are directed to be incorporated, should be gradually added and thoroughly rubbed with the pasty mass to complete the emulsion.

If any insoluble salts or other insoluble substances are to be added, they should be reduced to a very fine powder and rubbed with the emulsion when completed.

In making emulsions it frequently happens that the oil is added too fast to emulsify, or that the sides of the mortar become "greased" and will not "cling" to the oil and break up its globules. It is then necessary to start the emulsion over again in a dry, clean mortar, with a small quantity of fresh mucilage syrup, and work in the "cracked" emulsion in the mortar in the same manner as at first. The clinging surfaces must be maintained or the emulsion cannot be made.

On a large scale emulsions are best made in revolving churns or other apparatus by which the oil and mucilage may be thoroughly agitated. The mucilage sufficient for the whole batch is first put in the churn and the inside thoroughly covered, the oil is then added in portions and the mixture well agitated after each portion is added.

The mucilage or mucilage syrup which is used for emulsifying must be fresh and sweet, and of a uniform consistence without lumps.

The foregoing general directions apply particularly to emulsions in

which gum arabic is used as an emulsifying agent, but the same general method of manipulation may be employed when other emulsifying substances are employed. The following are the substances generally employed as emulsifying agents:

Acacia Mucilage Syrup.

For making emulsions it is most convenient to have a mucilage syrup prepared and ready, for when made by rubbing powdered gum arabic with water considerable delay is experienced and the results are not always satisfactory. It is therefore desirable to have the following syrup prepared for this purpose:

Best Gum Arabic, granulated,	6 ounces av.
Albumen, (white of egg),	8 fl.ounces
Glycerin,	4 fl.ounces
Boric Acid,	30 grains

Rub the boric acid to a very fine powder, and dissolve by rubbing with the glycerin. Mix the solution with the albumen in a wide-mouth bottle or jar, add the gum arabic, and stir several times a day with a stick from the bottom, until the gum is entirely dissolved, strain if necessary, stop tight, and put away in a cool place.

This requires two or three days to make, as heat should not be used to effect the solution. It should be kept on hand, but may be quickly made by using powdered gum arabic and rubbing with the glycerin etc., in a mortar.

This is used as the emulsifying agent instead of gum arabic alone, as it is more effective.

Casein may be used as an emulsifying agent; the method of preparing it is previously described. Condensed milk contains the casein of the milk and is probably the most convenient form of using this substance. The formula for emulsion of cod liver oil may be taken as as sample for others.

Irish moss has been proposed as an emulsifying agent, but it is liable to decomposition, and is not recommended.

Tincture of quillaya is a good emulsifying agent, especially for balsams, tars and heavy oils. It may be made with 1 part of quillaya, percolated with enough 60% alcohol to make 5 parts of the tincture.

Stronger Lime Water.

Sugar,	4 ounces av.
Lime, in lump, selected,	1 ounce av.
Water,	14 fl.ounces

Slake the lime by pouring on it half an ounce of hot water, and allowing to stand until it is reduced to a powder, add the water and sugar, allow to stand, and filter.

This is sometimes used in making preparations of cod liver oil that are used as emulsions, although it does not make a true emulsion,

but rather saponifies the oil, the calcium hydrate uniting with the oleic acid of the oil.

The Official Emulsions.

But few emulsions, compared with the number used, are recognized in the pharmacopœias; and they are, mostly, of an entirely different class than are popularly known as emulsions. The following formulas embrace those official in the U. S. Pharmacopœia, and the general formulas for emulsions of some other pharmacopœias.

EMULSUM AMYGDALÆ. U. S. Emulsion of Almond.

[Mistura Amygdalæ].

Sweet Almond,	60 Gm. or 240 grains
Acacia, in fine powder,	10 Gm. or 40 grains
Sugar,	30 Gm. or 120 grains
Water, sufficient to make	1000 Cc. or 9 fl.ounces

"Having blanched the almond, add the acacia and sugar and beat them in a mortar until thoroughly mixed, then rub the mass with 900 Cc. (or 8 ounces) of water, at first very gradually added; strain and add through the strainer enough water to make 1000 Cc. (or 9 fl.ounces)." <U. S.

Average dose.—120 Cc. (4 fl.ounces).

EMULSUM ASAFÆTIDÆ. U. S. Emulsion of Asafetida.

[Mistura Asafetidæ].

Asafetida, in selected tears,	40 Gm. or 200 grains
Water, sufficient to make	1000 Gm. or 11 fl.ounces

"Rub the asafetida in a mortar with 900 Cc. (or 10 fl.ounces) of water, at first very gradually added, until a uniform emulsion results. Then strain the mixture into a graduated vessel, and rinse the mortar and strainer with enough water to make the product measure 1000 Cc. (or 11 fl.ounces). Mix the whole thoroughly." <U. S.

Average dose.—16 Cc. (4 fl.drachms).

EMULSUM CHLOROFORMI. U. S. Emulsion of Chloroform.

[Mistura Chloroformi].

Chloroform,	40 Cc. or 160 minims
Expressed Oil of Almonds,	60 Cc. or 240 minims
Tragacanth, in very fine powder,	10 Gm. or 40 grains
Water, sufficient to make	1000 Cc. or 11 fl.ounces

"Introduce the tragacanth into a perfectly dry bottle of sufficient capacity, add the chloroform and shake the bottle thoroughly, so that every part of the surface may become wetted. Then add about 250 Cc. (or 2½ ounces) of water and incorporate it by vigorous shaking, next add the expressed oil of almond in several portions, shaking after each addition, and when the oil has become thoroughly emulsified,

add enough water in divided portions, shaking after each addition, until the product measures 1000 Cc. (or 11 fl.ounces). "<U. S.

Average dose.—8 Cc. (2 fl.drachms).

EMULSUM OLEI MORRHUÆ. U. S. Emulsion of Cod Liver Oil.

Cod Liver Oil,	500 Cc. or 17 fl.ounces
Acacia, in fine powder,	125 Gm. or 4½ ounces av.
Syrup,	100 Cc. or 3¾ fl.ounces
Oil of Gaultheria,	4 Cc. or 65 minims
Water, a sufficient quantity	

To make 1000 Cc. or 34 fl.ounces

"Rub the acacia with the cod liver oil in a dry mortar, until uniformly mixed, then add at once 250 Cc. (or 8½ fl.ounces) of water and triturate lightly and rapidly until a thick homogeneous emulsion is produced; to this add the oil of gaultheria and the syrup, with enough water to make the product measure 1000 Cc. (or 34 fl.ounces) and mix thoroughly.

Note.—The oil of gaultheria may be replaced, if desired, by a suitable quantity of oil of bitter almond, or other suitable flavoring." <U. S.

Average dose.—8 Cc. (2 fl.drachms).

EMULSUM OLEI MORRHUÆ CUM HYPOPHOSPHITIBUS.

U. S. Emulsion of Cod Liver Oil with Hypophosphites.

Cod Liver Oil,	500 Cc. or 17 fl.ounces
Acacia,	125 Gm. or 4½ ounces av.
Calcium Hypophosphite,	10 Gm. or 156 grains
Sodium Hypophosphite,	5 Gm. or 78 grains
Potassium Hypophosphite,	5 Gm. or 78 grains
Syrup,	100 Cc. or 3¾ fl.ounces
Oil of Gaultheria,	4 Cc. or 65 minims
Water, a sufficient quantity	

To make 1000 Cc. or 34 fl.ounces

"Rub the acacia with the cod liver oil in a dry mortar until uniformly mixed, then add at once 250 Cc. (or 8½ fl.ounces) of water and triturate lightly and rapidly, until a thick, homogeneous emulsion is produced, add the oil of gaultheria and incorporate thoroughly, dissolve the hypophosphites in 100 Cc. (or 3¾ fl.ounces) of water. Mix the solution with the syrup, and add the liquid gradually to the emulsion, with continued trituration. Lastly add enough water to make the product measure 1000 Cc. (or 34 fl.ounces) and mix thoroughly.

Note.—The oil of gaultheria may be replaced, if desired, by a suitable quantity of oil of bitter almond or other suitable flavoring." <U. S.

Average dose.—8 Cc. (2 fl.drachms).

EMULSUM OLEI TEREBINTHINÆ. U. S.**Emulsion of Oil of Turpentine.**

Rectified Oil of Turpentine,	15 Cc. or 244	minims
Expressed Oil of Almond,	5 Cc. or 81	minims
Syrup,	25 Cc. or 406	minims
Acacia, in fine powder,	15 Gm. or 232	grains
Water, a sufficient quantity		

To make 100 Cc. or 3 $\frac{3}{8}$ fl.ounces

"Introduce the acacia into a perfectly dry bottle of sufficient capacity, add the rectified oil of turpentine and the expressed oil of almond and shake the bottle thoroughly. Then add about 30 Cc. (or 1 fl.ounce) of water and incorporate it by vigorously shaking. When the oil has been completely emulsified, add first the syrup, in several portions, shaking after each addition, and then enough water, in divided portions, shaking after each addition, to make the product measure 100 Cc. (or 3 $\frac{3}{8}$ fl.ounces)." <U. S.

Average dose.—4 Cc. (1 fl.drachm).

Other Emulsions.

Besides the foregoing emulsions, official in the U. S. and Br. P., are others for which there is considerable demand. The formulas for some of these are given in the Nat. Form. and B. P. C., Form. Besides acacia, which is the substance used in the official emulsions, tragacanth, Irish moss, soap-bark, condensed milk, the yolk of eggs and pancreatin are employed as the emulsifying ingredients in various unofficial formulas. The following are the more important of the unofficial emulsions, but many other combinations are prepared in this form, and may be made, if desired, in a similar manner.

Emulsum Petrolei. Emulsion Petroleum. Liquid petrolatum 6 ounces, condensed milk 3 ounces, syrup 3 ounces, cinnamon water 4 ounces, lime water 4 ounces. Rub the liquid petrolatum with the condensed milk in a mortar and add, first the lime water, then the cinnamon water, and lastly, the syrup; rubbing them well together to form an emulsion. What is known as mineral glycerin, glymol, abolene, glycoleum etc., forms of liquid petrolatum, may be used for making this emulsion.

Emulsio Petrolei cum Hypophosphitibus. B. P. C. Emulsion of Petroleum with Hypophosphites. Liquid paraffin 8 fl.ounces, gum arabic, in powder, 4 ounces; oil of cinnamon 24 minims, tragacanth, in powder, 120 grains; calcium hypophosphite 192 grains, sodium hypophosphite 192 grains, distilled water, a sufficiency. Prepare an emulsion in a similar manner as the U. S. Emulsion Cod-liver Oil with Hypophosphites of Lime and Soda. Dose 1 to 4 fl.drachms.

Emulsio Olei Morrhue. Emulsion of Cod Liver Oil. Cod liver oil 8 fl.ounces, the yolks of two eggs, tragacanth, in powder, 16 grains; elixir of gluside 1 fl.drachm, tincture of benzoin 1 fl.drachm, spirit of

chloroform 4 fl.drachms, essential oil of bitter almonds 8 minims, distilled water sufficient to produce 16 fl.ounces. Prepare the emulsion according to the general directions. Dose 2 to 8 fl.drachms.

Emulsion Cod Liver Oil with Lactophosphates Compound. Solution iron lacto-phosphate $\frac{1}{2}$ fl.ounce, solution calcium lacto-phosphate 1 fl.ounce, emulsion cod liver oil $14\frac{1}{2}$ fl.ounces. Mix the solutions with the emulsion. A dessertspoonful contains 1 grain iron lacto-phosphate and 2 grains lime lacto-phosphate. This may also be made by rubbing 64 grains iron lacto-phosphate and 128 grains calcium lacto-phosphate with a pint of emulsion cod liver oil.

Emulsion Cod Liver Oil with Lime Lacto-phosphate. Solution calcium lacto-phosphate 1 fl.ounce, emulsion cod liver oil 15 fl.ounces. Mix them thoroughly. A dessertspoonful contains 2 grains lime lacto-phosphate with emulsion cod liver oil. This may also be made by rubbing 128 grains of precipitated lime lacto-phosphate with a pint of emulsion cod liver oil.

Emulsion Cod Liver Oil with Lime Phosphate. Solution calcium phosphate 1 fl.ounce, emulsion cod liver oil 15 fl.ounces. Add the solution to the emulsion and mix them thoroughly. A dessertspoonful, the usual dose, contains 2 grains lime phosphate with emulsion cod liver oil. This may also be made by rubbing 256 grains precipitated lime phosphate with a pint of emulsion cod liver oil.

Cod Liver Oil with Malt Extract. Cod liver oil 8 fl.ounces, extract of malt 8 fl.ounces, oil wintergreen 20 minims, oil bitter almonds 5 minims. Rub the oils with the extract of malt as directed for making emulsions. The dose is a dessertspoonful to a tablespoonful containing 50 percent., each, cod liver oil and malt extract.

Emulsion Cod Liver Oil with Pancreatin. Pancreatin, in powder, 128 grains, cod liver oil 8 fl.ounces, glycerin 3 fl.ounces, water 3 fl.ounces, acacia mucilage syrup 2 fl.ounces, oil of wintergreen 10 minims, oil of bitter almonds 5 minims. Mix the pancreatin with the water and glycerin, and let stand for 6 hours, then add the acacia mucilage syrup and rub the oils with the mixture to make an emulsion. A dessertspoonful contains 2 grains pancreatin, with 50 percent. cod liver oil.

Emulsion Cod Liver Oil with Pancreatin and Pepsin. Pepsin, saccharated, 128 grains; emulsion cod liver oil with pancreatin 1 pint. Rub the pepsin first with a portion of the emulsion, then add the remainder. A dessertspoonful contains 2 grains each of pepsin and pancreatin with 50 percent. cod liver oil.

Emulsion Cod Liver Oil with Pepsin. Saccharated pepsin 128 grains, emulsion cod liver oil 1 pint. Rub the pepsin first with a small portion of the emulsion, and then with the remainder and mix them thoroughly. A dessertspoonful contains 2 grains of pepsin combined with emulsion cod liver oil.

Emulsion Cod Liver Oil Peptonized. Peptonized Cod Liver Oil and Milk. Condensed milk 2 ounces, saccharated pepsin 128 grains, acacia mucilage syrup 3 fl.ounces, cod liver oil 8 fl.ounces, oil of bitter almonds 10 minims, oil of wintergreen 5 minims. Rub the condensed milk with the saccharated pepsin and 1 fl.ounce of water, and allow them to stand for 6 hours, then add the mucilage syrup and rub the oils with the mixture to make an emulsion; finally add the water as directed. The dose is a dessertspoonful to a tablespoonful. Many combinations may be made by mixing this with other preparations, solutions, salts etc.

Emulsion Cod Liver Oil with Yolk of Egg. Cod Liver Oil and Glyconin. A kind of emulsion is made with the yolks of eggs by shaking them with cod liver oil and other ingredients: The yolks of eggs 2½ fl.ounces, glycerin 3 fl.ounces, diluted phosphoric acid 2 fl.ounces, sherry wine 4 fl.ounces, cod liver oil 10 fl.ounces, oil bitter almonds 10 drops, oil wintergreen 10 drops. Beat the yolks of eggs and glycerin together, then add the oils gradually, shaking them well together after adding each portion. Lastly add the acid and wine and mix them well together. The dose is a dessertspoonful to a tablespoonful.

Emulsion Cod Liver Oil with Wild Cherry. Fluidextract of wild cherry 4 fl.ounces, acacia mucilage syrup 4 fl.ounces, cod liver oil 8 fl.ounces. Rub the oil with the mucilage syrup and add the fluidextract. A dessertspoonful contains ½ drachm fluidextract wild cherry with 50 percent. cod liver oil.

Emulsion Copaiba. Acacia mucilage syrup 6 fl.ounces, balsam copaiba 4 fl.ounces, syrup 3 fl.ounces, water 3 fl.ounces, oil wintergreen 20 drops. Rub the oil and balsam with the mucilage syrup and add the syrup and water as directed for making emulsions. A fl.drachm contains 15 minims balsam copaiba. The dose is a teaspoonful to a dessertspoonful or more.

The most convenient way of making this emulsion is as follows: Mucilage acacia 4 ounces, balsam copaiba 2 ounces, syrup 2 ounces, essence cinnamon 1 drachm. Put the mucilage in an 8 ounce bottle, add the balsam and shake thoroughly, then add the syrup and essence and shake.

ESERINE. Physostigmine.

An alkaloid obtained from physostigma. Although two salts of this alkaloid are official, under the title "Physostigmine," it and its salts are more commonly known in the market as "Eserine."

Eserine Hydrobromide. This may be prepared by neutralizing hydrobromic acid with the alkaloid eserine and crystallizing.

Eserine Hydrochloride. This may be prepared by neutralizing diluted hydrochloric acid with the alkaloid eserine, concentrating and crystallizing.

Eserine Salicylate. This is official in the U. S. P. under the title *Physostigminæ Salicylas*, which see.

Eserine Sulphas. This is official in the U. S. P. and the Br. P. under the title *Physostigminæ Sulphas*, which see.

Average dose of the eserine salts 0.001 Gm.=1 milligramme ($\frac{1}{64}$ grain).

Eserine Pilocarpine. This is a combination of one part of eserine salicylate with two parts of pilocarpine hydrochloride. It is a white powder, soluble in water and alcohol and is used as an anodyne and cathartic in colic of horses. Dose from 3 to 6 grains by hypodermic injection.

Eseridine. $C_{15}H_{23}N_3O_3$. This alkaloid exists in physostigma associated with eserine. It has action similar to eserine but only one-sixth as powerful. A tartrate of this alkaloid is used in colic of horses and cattle. Dose 5 grains by hypodermic injection.

ESSENTIÆ — ESSENCES.

The term *Essence* is applied in a general way to the important or essential part of plants or other substances, and in pharmacy to a class of preparations made from or possessing the essential principles of substances, such as essential oils or their solutions in alcohol, ethers used as artificial flavors, fruit extracts or tinctures of odorous substances used for flavoring or in perfumery etc.

Many preparations, commonly known as essences, are found in the spirits of the U. S. and other pharmacopœias, and others are found among the ethers, fluidextracts, tinctures etc., while a few unofficial preparations, as essence pepsin, essence Jamaica ginger etc. have come to be known by the name of essences.

It is intended in this work to class under this heading only such medicinal preparations as are commonly called essences—the esprits and essences used in perfumery being classed under perfumes.

The following medicinal preparations are known as essences:

Essence Calisaya.

An essence of calisaya which is quite similar to elixir of calisaya is sometimes called for. It may be made as follows:

Fluidextract Calisaya Bark,	1 $\frac{1}{3}$ fl.ounces
Sherry Wine,	12 fl.ounces
Syrup,	3 fl.ounces
Spirit of Cinnamon,	$\frac{1}{2}$ drachm
Tincture Fresh Orange Peel,	$\frac{1}{2}$ ounce

Mix, and after standing, filter clear. A fl.drachm represents 5 grains of calisaya bark.

Essence Coca.

Fluidextract Coca,	1 1/3 fl.ounces
Sherry Wine,	12 fl.ounces
Syrup,	3 fl.ounces
Spirit of Cinnamon,	1/3 drachm
Tincture Fresh Orange Peel,	1/2 ounce

Mix them and after standing filter clear. A fl.drachm represents 5 grains of coca leaves. See also Coca Wine.

Essence Jamaica Ginger.

This is more properly Tincture or Extract of Jamaica Ginger, but it has become well known in the market as Essence because of being popularly advertised.

Jamaica Ginger, in fine powder,	3 pounds av.
Slaked-lime,	6 ounces av.
Alcohol, sufficient to make	5 pints
Water, sufficient to make,	1 gallon

Mix the ginger and slaked-lime intimately and with the alcohol mix 3 pints of water, moisten the powder with the liquid and pack in a percolator, pour upon it the remaining liquid and, after standing 6 hours, begin to percolate. When the liquid covering the ginger etc. has disappeared, add water and continue the percolation until one gallon of percolate has passed. The percolation may be continued with water, and the liquid evaporated to a soft extract and added to the gallon first obtained.

Essence Pancreatin.

Pancreatin, pure,	128 grains
Glycerin, by weight,	4 ounces
Borax,	40 grains
Elixir, sufficient to make	16 fl.ounces

Mix the glycerin with 12 ounces of the elixir and dissolve the borax in the solution, add the pancreatin and allow to stand for 1 day, then filter and add through the filter enough elixir to make 16 fl.ounces.

A fl.drachm contains 1 grain pancreatin. Dose a dessertspoonful.

Essence Pepsin.

Scale Pepsin,	128 grains
Glycerin, by weight,	4 ounces
Hydrochloric Acid,	20 minims
Sherry Wine, free from tannin,	11 fl.ounces
Soluble Elixir Flavoring,	1 fl.ounce

Mix the liquids and dissolve the pepsin in the mixture, after 12 hours filter. A fl.drachm contains 1 grain pure pepsin. Dose a dessertspoonful or more.

ETHYL.

The radical ethyl is the most important of the series of hydrocarbons known as the alcohol radicals. It has not been isolated as a substance, and is known only in its compounds.

It is the second member of the ethylic or alcohol series, $\text{C}_n\text{H}_{2n+1}$.

Its combinations with various acids form a variety of oxides, which are known as "ethers," and its combinations with the elements of water forms ethyl hydrate, which is familiarly known as "alcohol." As most of the ethyl compounds have been noticed under the headings "alcohol" and "ether," further description here will be unnecessary. For Ethers see Latin title *Æthers*.

Ethyl Acetate. Acetic Ether. This is described under the title *Æther Aceticus*, which see, page 396.

Ethyl Benzoate. Benzoic Ether. This may be produced by the action of benzoic acid upon ethyl alcohol, in the same manner as other ethers are produced by the action of acids upon ethyl oxide. It is used in medicine as an antiseptic and in compound ethereal flavors.

Ethyl Bromide. Hydrobromic Ether. $\text{C}_2\text{H}_5.$ Br. This ether has been used as an anesthetic, but was not very favorably received. It has similar properties as chloroform. Sp. gr. 1.475. See *Æther Hydrobromicus*.

Ethyl Butyrate. Butyric Ether. This is prepared by the interaction of alcohol and butyric acid, and separation of the ethereal product. It is used as a flavoring in compound fruit essences.

Ethyl Carbamate. This is described under its official title, *Æthylis Carbamas*, which see, page 399.

Ethyl Chloride. Hydrochloric Ether. This is described under its official title, *Æthylis Chloridum*, which see, page 399.

Ethyl Formate. Formic Ether. This is described under the title *Æther Formicus*, which see, page 397.

Ethyl Iodide. Hydriodic Ether. This is a very unstable compound having sp. gr. 1.975 and boiling at 72°C . It has been somewhat used by inhalation for bronchitis and phthisis. See *Æther Hydriodic*.

Ethyl Salicylate. Salicylic Ether. This is prepared by the interaction of alcohol with salicylic acid. It has the same action as methyl salicylate and other salicylates. Sp. gr. about 1.184. Dose 5 to 15 minims.

Ethyl Sebacate. Sebacic Ether. This is produced by the interaction of alcohol with sebacic acid. It has the odor of melon, and is used in compound flavorings.

Ethyl Urethane. Urethane. This is prepared by the interaction of urea nitrate and ethyl chloral at $120^\circ\text{--}130^\circ\text{C}$. The resultant urethane is dissolved out by ether and recrystallized. This is employed in medicine as a hypnotic, with good results in doses of from 15 to 45

grains, but in chemistry it is chiefly useful in combination with chloral hydrate and alcohol under the name *Somnal*, which see.

Ethyl Valerate. Valerianic Ether. Produced by the interaction of alcohol with valerianic acid, and separation of the etherial product.

Ethylamine. $\text{NH}_2(\text{C}_2\text{H}_5)$. The base of the ethyl series, obtained by substituting an atom of hydrogen in ammonia by the ethyl radical. It is a colorless, volatile, inflammable liquid.

Ethylene. C_2H_4 . Also called ethene or olefiant gas. It is an inflammable gas, chemically hydrogen bicarburet, contained in coal-gas.

Ethylene Bromide. This is a faintly-brown colored liquid having an odor somewhat resembling chloroform and a sweetish taste; at 0°C . it solidifies to a snow-white, crystalline mass; its boiling point is 131°C .; sp. gr. at 21°C . 2.163; insoluble in water but mixes with spirit or fatty oils. This should not be confounded with ethyl bromide. Its vapor is poisonous to inhale.

Ethylidene. A theoretical unsaturated divalent radical, metameric with ethylene.

The foregoing ethyl derivatives are not employed in medicine, but are mentioned as they are bases of some of the more recent compounds which have been brought to the notice of the medical profession.

EUCAINE. Beta-Eucaine.

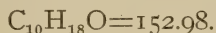
This is, chemically, the hydrochloride of trimethyl-benzooxy-piperidin. It is a white powder soluble in about 30 parts of water or in alcohol. Like cocaine it is used as a local anesthetic but is claimed to be less toxic and that it does not dilate the pupil not contract the blood vessels. It is generally applied as a 2 to 5 percent. solution in boiling water.

Eucaine Acetate. This salt of eucaine is very soluble in water and is used for the same purposes as eucaine.

Eucaine Lactate. This is employed chiefly as a local anesthetic in the eye. It is soluble in about 5 parts of water. Its solution is brushed over the parts to produce local anesthesia.

Pure Food and Drugs Law. Alpha- and Beta- Eucaine are specified in the Pure Food and Drugs Law as preparations which must be designated on the labels of preparations containing them; as mixtures, ointments, powders and solutions. Alpha Eucaine is now seldom used, the Beta Eucaine being generally employed and known commercially as Eucaine.

EUCALYPTOL. U. S. Eucalyptol.

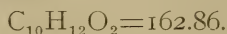


"An organic oxide (cineol), obtained from the volatile oil of *Eucalyptus Globulus*, Labillardière (Fam. Myrtaceæ), and from other sources. It should be kept in well-stoppered, amber-colored bottles in a cool place, protected from light." <U. S.

Eucalyptol is obtained by fractional distillation of eucalyptus oil, the portion which has specific gravity 0.925 at 25°C. (77°F.), being reserved. It is soluble in all proportions in alcohol, and boils at 176° to 177°C. (348.8° to 350°F.).

Average dose.—0.3 Cc. (5 minims).

EUGENOL. U. S. Eugenol.



"An unsaturated aromatic phenol [$\text{C}_6\text{H}_3(\text{OH})(\text{OCH}_3) \cdot \text{C}_3\text{H}_5$:4:3:1], obtained from oil of cloves and other sources. It should be kept in well-stoppered, amber-colored bottles, in a cool place, protected from light." <U. S.

This is first made official in the present U. S. P. It is the chief constituent of oil of cloves, and is found in other volatile oils. Sp. gr. 1.072 to 1.074 at 25°C. (77°F.). It is miscible with alcohol in all proportions, and should be soluble in 2 parts of 70% alcohol. It has great antiseptic properties and has been recommended for the treatment of tubercular diseases.

Average dose.—0.2 Cc. (3 minims).

EUQUININE.

This is, chemically, quinine carbonic ether, or quinine ethylcarbonate. It is readily soluble in water or alcohol and is used as a substitute for ordinary quinine, usually in powders or tablets. Dose and action the same as quinine.

Euquinine Hydriodate. A compound iodate salt of euquinine and sodium iodide having the properties of both.

Euquinine Salicylate. This is a compound of euquinine and salicylic acid containing about 75 percent. of euquinine. It is used as a substitute for quinine salicylate, being tasteless and having the same action as that salt.

EUROPHIN. Phenyl-Ethyl-Urethane.



A white crystalline powder with a faint aromatic odor and a slight after-taste of cloves, insoluble in water but readily soluble in alcohol and partly alcoholic liquids. It is prepared by the interaction of aniline and chloroformic ethyl ester. It is recommended as an antipyretic and antirheumatic, relieving swelling and reducing swelling of the joints. The dose as an antipyretic is 8 grains and as an antirheumatic 6 grains, 3 or 4 times a day, dissolved in wine or elixir. It is applied externally as a dusting powder and in ointments.

Europhin Di-isobutylortho-cresol Iodide. This is a compound preparation allied to aristol, in the class of iodoform substitutes. It is prepared by the interaction of isobutyl alcohol and ortho-cresol in the presence of zinc chloride at a high temperature, and the resultant com-

pound which is formed is dissolved in dilute alkali and precipitated with a solution of iodine in potassium iodide, the precipitate when washed and dried being Europhin. It is an amorphous, yellow powder of peculiar aromatic odor, insoluble in water, but readily soluble in alcohol, ether, chloroform and fatty oils. It is five times as bulky as iodoform. It is used as a dusting powder and in ointments and solutions in fatty oils, alboline etc.

EXALGINE. Methylacetanilid.



This is a crystalline compound allied to acetanilid, first brought to notice by A. W. von Hoffman in 1874. It is prepared by warming together monomethyl aniline and acetyl chloride, dissolving out and crystallizing the monomethylaniline salt, which is removed as a hydrochloride. It is soluble in cold and more soluble in warm water, melts at 100°C. and boils between 240 and 250°C. without decomposition. Exalgine is an analgesic. Its effects are similar to those of antipyrin, but it has not proven a safe compound. The dose is $\frac{1}{2}$ to 4 grains.

EXODYNE.

This is a white powder which may be used as an anodyne and anti-rheumatic. It may be prepared by mixing intimately

Acetanilid,	19 parts
Sodium Salicylate,	1 part
Sodium Bicarbonate,	1 part

Reduce to a fine powder and mix intimately. The dose is from 5 to 8 grains.

EXTRACTA — EXTRACTS.

The class of galenicals known as extracts or solid extracts are preparations usually in the form of mass or powder, and intended to represent in a concentrated form the soluble portions of vegetable drugs. In pharmacy they are used for making pills, plasters ointments, suppositories, tablets and many other forms of medicines where a concentrated preparation is desirable. Various methods are employed for obtaining the soluble properties of the drugs, as may best be suited to their nature, and their solutions are then concentrated by evaporation in various ways to the required consistence.

In large manufacturing establishments the evaporation is usually conducted in vacuo, at a low temperature, as the volatile properties are best preserved in this manner; but as this process is not expedient for the ordinary pharmacist, the formulas here given are designed for such conveniences as may readily be employed by them.

For making small quantities of solid extracts the fluid extract of the drug may be evaporated by a water-bath to pilular consistence.

For prescription work, powdered extracts are much used and are more convenient than extracts in mass. Many extracts cannot well be reduced to a powder without admixture with other substances, but they are furnished by manufacturers who claim to give a true representative of the extract in the form of powder.

The following formulæ are for extracts official in the U. S., Br. and a few from European pharmacopœias. They represent, however, but part of the extracts quoted that may be made; for extracts may be prepared from nearly all vegetable drugs; but from the formulæ given the intelligent druggist or manufacturer will have no trouble to prepare any extract that may be desired by using the same menstruum for exhausting the drug which is directed for making a fluid extract of the same and evaporation in the manner directed for making other extracts of the same nature.

General Formula for Making Extracts.

The general directions which apply to making all kinds of extracts, may be briefly stated as follows:

The substance, any convenient quantity.

The menstruum, a sufficient quantity.

Moisten the drug with the menstruum sufficient to nearly cover it, allow to macerate from 12 to 24 hours; pack in the water-bath percolator, pour menstruum upon it and set in a warm place for one or two days; then heat moderately, adding the menstruum or water to the drug, and percolate until the drug is exhausted. Evaporate the percolate by distillation if it contains alcohol, or by gentle heat if aqueous, to a pilular consistence, adding from 2 to 5 percent. of glycerin to such extracts as become hard and dry after standing, unless wanted in the powdered form, then no glycerin should be added.

Extracts from Expressed Juices.

Inspissated Juices.

The extracts made by evaporating the expressed juices of fresh plants have always been considered superior to those made from the dried plants, and the popularity of the English extracts made by reliable houses in this manner is well known. The following is the general process of the Br. P. for making extracts in this manner.

The fresh leaves, tops or plants, any convenient quantity.

Bruise in a stone mortar and press out the juice, heat it gradually to 130°F. (54.4°C.), and separate the green coloring matter by straining through a calico filter. Heat the strained liquid to 200°F. (93.3°C.) to coagulate the albumen, and again filter through calico. Evaporate the filtered liquid by a water-bath at a low temperature

to the consistence of a thin syrup, then add to it the green coloring matter previously obtained, and pass through a hair-sieve; then stir together and continue the evaporation at a temperature not exceeding 140°F. (60°C.) until an extract of pilular consistence is obtained.

Duplex Extracts.

In the Swiss Pharm. (Pharm. Helv.) a number of formulas are given for Duplex Extracts, which are quite similar to Abstracts, formerly official in the U. S. P.

A general formula for duplex extracts is:

The Drug, 200 parts

The Menstruum, a sufficient quantity.

Rice Powder, sufficient to make of dry extract 100 parts

A fluid extract of the drug is made by percolation with menstruum suited to the drug. Alcohol, 200 parts, is then to be added and the mixture allowed to stand 24 hours. The clear liquid is then poured off and filtered, and the residue is warmed with 40 parts of water and when cold 120 parts of alcohol added, and, after standing, filtered. The two liquids are then to be mixed and a weighed portion evaporated to a dry extract. The alcohol is then distilled from the liquid and the residue evaporated to a soft extract and a sufficient quantity of powdered rice added so that when reduced to a dry powder, 100 parts shall be obtained for the 200 parts of the drug taken.

In this manner are prepared duplex extracts of aconite root, belladonna root, conium seeds, digitalis leaves, hyoscyamus leaves and stramonium seeds

The formulas which follow are directed to be prepared by water-bath percolation, because this process has proven so much more efficient than any other for obtaining the soluble properties of drugs. Where the official formulas differ in any important particular, the difference is noted in the formula.

EXTRACTUM ALOES. U. S., Br. Extract of Aloes.

Dissolve aloes, 1 part, in boiling water, 10 parts, and strain. Set aside for 12 hours, then pour off the clear liquid from the residue and evaporate by a current of warm air or by the heat of a water-bath to dryness. The dose is from 2 to 6 grains.

The U. S. official is extract of aloes; the Br., extract of Barbados aloes; they are both made by mixing 100 Gm. (or 10 ounces) of aloes with 1000 Cc. (or 100 ounces) of boiling water, stirring and allowing to stand for 12 hours, U. S., (24 hours, Br.); then pouring off the clear liquor, straining and evaporating by means of a water-bath or steam at a temperature not exceeding 60°C. (140°F.) to dryness.

EXTRACTUM ANTHEMIDIS. Br. Extract of Chamomile.

The Br. pharmacopœia directs chamomile flowers, 1 pound, (or 1000 Gm.), oil of chamomile, 15 minims (or 2 Cc.), distilled water, 1 gallon (Imperial measure) or 10 liters. Boil the chamomile flowers with the distilled water until the volume is reduced to one-half; strain, press, filter, evaporate the filtrate to the consistence of a soft extract; add the oil of chamomile towards the end of the process.

Dose, 2 to 8 grains.

EXTRACTUM ARNICÆ RADICIS. Extract of Arnica Root.

Exhaust arnica root with diluted alcohol, distil off the alcohol and evaporate the remainder to a thick extract.

An extract of arnica flowers is made in the same manner. Extract of arnica is used in making plasters.

The U. S. formula, formerly official, was arnica root 1000 Gm., diluted alcohol, a sufficient quantity. Exhaust by percolation, reserving the first 900 Cc. that pass, and evaporate the remainder to 100 Cc. by water-bath heat not exceeding 50°C. (122°F.); mix the liquids and evaporate at the same or a lower temperature to pilular consistence.

This is used chiefly for making arnica plaster and ointment or salve.

EXTRACTUM BELLADONNÆ FOLIORUM. U. S.**Extract of Belladonna Leaves.**

The U. S. formula is: "Belladonna leaves, in No. 60 powder, 1000 Gm., alcohol, water, each, a sufficient quantity. Mix 2000 Cc. of alcohol with 1000 Cc. of water and having moistened the powder with 400 Cc. of the mixture, pack firmly in a cylindrical percolator; then add enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 48 hours. Then allow the percolation to proceed gradually, adding menstruum, using the same proportions of alcohol and water as before, until 3000 Cc. of tincture are obtained, or the belladonna leaves are exhausted. Reserve the first 900 Cc. of the percolate, evaporate the remainder at a temperature not exceeding 50°C. (122°F.) to 100 Cc., mix the residue with the reserved portion, and evaporate at or below the above mentioned temperature to a pilular consistence."

"When assayed by the process given, extract of belladonna leaves should contain 1.4 percent. of mydriatic alkaloids. If the extract should be found to contain more than this percentage, sufficient powdered sugar of milk should be added to reduce it to the standard of 1.4 percent." <U. S.

The assay process given in the U. S. P. is practically the same as for belladonna leaves. Most retail druggists buy this extract, made by

reliable manufacturers, upon whom they depend to furnish an assayed extract.

Average dose.—0.010 Gm.=10 milligrammes ($\frac{1}{4}$ grain).

EXTRACTUM BELLADONNÆ ALCOHOLICUM. Br.

Alcoholic Extract of Belladonna.

“An extract containing one percent. of the alkaloids of Belladonna Root.” < Br.

This is prepared by evaporating 1 fl.ounce (or 50 Cc.) of liquid extract of belladonna, Br., in a counterpoised basin, on a water-bath to the consistence of a moderately firm extract. It is then to be weighed and the difference between the weights of the residue and three-quarters of an ounce (or $37\frac{1}{2}$ grammes) gives the weight of milk sugar to be used as a dilutent for each fl.ounce (or 50 Cc.) of the liquid extract.

Any quantity of the alcoholic extract of belladonna may be prepared with the same proportion of milk sugar as is indicated by the test sample. Dose, $\frac{1}{4}$ to 1 grain.

EXTRACTUM BELLADONNÆ VIRIDE. Br.

Green Extract of Belladonna.

“Bruise the fresh leaves and young branches of *Atropa Belladonna*, Linn., in a mortar; press out the juice and heat it to 130°F. (54.4°C.); separate the green coloring matter by a calico filter; heat the strained liquid to 200°F. (93.3°C.); filter. Evaporate the filtrate on a water-bath to the consistence of a thin syrup; add to it the green coloring matter previously separated and passed through a hair sieve, stir the whole together, and evaporate at a temperature not exceeding 140°F. (60°C.) to the consistence of a soft extract.” < Br.

Dose, $\frac{1}{4}$ to 1 grain.

Several of the European pharmacopœias direct the extract of belladonna leaves to be prepared from the fresh juice in a manner similar to the Br. The Green Extract is particularly used in making belladonna plaster and oil solutions.

EXTRACTUM CANNABIS INDICÆ. U. S., Br.

Extract of Indian Cannabis. U. S. Extract of Indian Hemp. Br.

The U. S. P. directs

Indian Cannabis, in No. 20 powder, 1000 Gm.

Alcohol, a sufficient quantity.

The powder is to be percolated with alcohol until exhausted, the alcohol is then to be distilled from the percolate and the residue evaporated in a porcelain dish, on a water-bath to pilular consistence.

Average dose.—0.010 Gm.=10 milligrammes ($\frac{1}{5}$ grain).

The Br. P. directs Indian Hemp in coarse powder to be exhausted with 90% alcohol, and the percolate to be evaporated to the consistency of a soft extract. Dose, $\frac{1}{4}$ to 1 grain.

EXTRACTUM CASCARÆ SAGRADÆ. Br.

Extract of Cascara Sagrada.

"Moisten cascara sagrada, in No. 20 powder, with distilled water, and let it remain a few hours to soften and swell; then place it loosely in a percolator and percolate with more distilled water until it is exhausted. Evaporate in a water-bath to dryness. Dose, 2 to 8 grains." <Br.

EXTRACTUM CIMICIFUGÆ. U. S.

Extract of Cimicifuga. [Black Cohosh].

Fluidextract of Cimicifuga, 100 Cc.

Glycyrrhiza, (peeled Russian), in No. 80 powder,

A sufficient quantity to make 25 Gm.

"Evaporate the fluidextract of cimicifuga in a porcelain dish, by means of a water-bath, at a temperature not exceeding 70°C. (158°F.), with constant stirring, to complete dryness. Reduce the product to a fine powder and add enough powdered glycyrrhiza to make the finished product weigh 25 Gm. Mix thoroughly." <U. S.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

Most fluidextracts prepared with alcohol as a menstruum may be converted into extracts in the same manner as cimicifuga.

EXTRACTUM COLCHICI CORMI. U. S.

Extract of Colchicum Corm.

Colchicum Corm, in No. 60 powder, 1000 Gm.

Acetic Acid, 350 Cc.

Water, a sufficient quantity.

"Mix the acetic acid with 1500 Cc. of water, and having moistened the powder with 500 Cc. of the mixture, pack it moderately in a cylindrical glass percolator; then add enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator close the lower orifice, and, having closely covered the percolator, macerate for 48 hours. Then allow the percolation to proceed gradually, adding first the remainder of the menstruum and then water, until the colchicum corm is exhausted. Evaporate the percolate in a porcelain vessel by means of a water-bath, at a temperature not exceeding 80°C. (176°F.), to a pilular consistence."

"When assayed by the process given, Extract of Colchicum Corm should contain 1.4 percent. of colchicine. If the extract should be found by assay to contain more than this percentage, sufficient pow-

dered sugar of milk should be added to reduce it to the standard of 1.4 percent." < U. S.

The assay process given in the U. S. P. is practically the same as for Colchicum Corm. Most retail druggists buy this extract, made by reliable manufacturers, upon whom they depend to furnish an assayed extract.

Average dose.—0.065 Gm.=65 milligrammes (1 grain).

Extractum Colchici. Br. **Extract of Colchicum.** Under this title the Br. P. directs an extract to be made by crushing fresh colchicum corms deprived of their coats; pressing out the juice, allowing the feculence to subside; decanting to a clear liquid; heating it to 212°F. (100°C.), and evaporating at a temperature not exceeding 160°F. (71.1°C.), to the consistence of a soft extract. Dose, $\frac{1}{4}$ to 1 grain.

EXTRACTUM COLOCYNTHIDIS. U. S. **Extract of Colocynth.**

Colocynth, freed from the seeds,

1000 Gm.

Diluted Alcohol, a sufficient quantity.

"Reduce the colocynth to a coarse powder by grinding or bruising, and macerate it in 3500 Cc. of diluted alcohol for four days, with occasional stirring; then express strongly, and strain through flannel. Pack the residue, previously broken up with the hands, firmly in a cylindrical percolator, cover it with the strainer, and gradually pour diluted alcohol upon it until the tincture and expressed liquids, mixed together, measure 5000 Cc. Distil off the alcohol from the mixture by means of a water-bath evaporate the residue to dryness, and reduce the dry mass to powder." < U. S.

Average dose.—0.030 Gm.=30 milligrammes ($\frac{1}{2}$ grain).

EXTRACTUM COLOCYNTHIDIS COMPOSITUM. U. S., Br.

Compound Extract of Colocynth.

The U. S. formula is

Extract of Colocynth,	160 Gm. or 160 grains
Purified Aloes,	500 Gm. or 500 grains
Resin of Scammony, fine powder,	140 Gm. or 140 grains
Cardamom, in No. 60 powder,	60 Gm. or 60 grains
Soap, dried, and in coarse powder,	140 Gm. or 140 grains
Alcohol,	100 Cc. or 100 minims

Heat the aloes on a water-bath until completely melted, then add the alcohol, and having stirred the mixture thoroughly, strain it through a very fine sieve, which has been just dipped in boiling water. To the strained mixture add the soap, extract and resin, and heat the mixture not to exceed 120°C. (248°F.), until it is perfectly homogeneous, and a thread taken from the mass becomes brittle when cold. Then remove from the heat, add the cardamom, mix thoroughly and

cover until cold, then powder. This is much used in making cathartic pills.

Average dose.—0.500 Gm.=500 milligrammes ($7\frac{1}{2}$ grains).

The Br. formula is:

Colocynth pulp, 150 Gm. (or 6 ounces); extract of Barbados aloes, 300 Gm. (or 12 ounces); scammony resin, 100 Gm. (or 4 ounces); curd soap in shavings, 100 Gm. (or 4 ounces); cardamom seeds, in finest powder, 25 Gm. (or 1 ounce); alcohol, 4 liters (or 1 Imperial gallon).

Macerate the colocynth pulp in the alcohol for four days; press out the tincture; remove the alcohol by distillation; add the extract of aloes, scammony resin and soap; evaporate to the consistence of a firm extract, adding the cardamoms towards the end of the process. Dose, 2 to 8 grains.

EXTRACTUM DIGITALIS. U. S. Extract of Digitalis.

Fluidextract of Digitalis,

100 Cc.

“Evaporate the fluidextract of digitalis in a porcelain dish, by means of a water-bath, at a temperature not exceeding 50°C . (122°F .), with constant stirring, until it is reduced to pilular consistence.”
<U. S.

Average dose.—0.010 Gm.=10 milligrammes ($\frac{1}{8}$ grain).

EXTRACTUM ERGOTÆ. U. S., Br. Extract of Ergot.

The U. S. formula is:

Ergot, in No. 40 powder,	1000.0 Gm.
Diluted Hydrochloric Acid,	50.0 Gm.
Monohydrated Sodium Carbonate,	8.5 Gm.
Glycerin,	12.5 Gm.
Alcohol,	

Water, each, a sufficient quantity

To make

125.0 Gm.

“Mix 1000 Cc. of alcohol with 400 Cc. of water, and, having moistened the powder with 500 Cc. of the mixture, pack it firmly in a cylindrical percolator; then add sufficient menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator close the lower orifice, and, having closely covered the percolator, macerate for 48 hours. Then allow the percolation to proceed gradually, adding menstruum, using the same proportions of alcohol and water as before, until the ergot is exhausted.

Evaporate the percolate in a porcelain dish, by means of a water-bath, at a temperature not exceeding 50°C . (122°F .) to 250 grammes; add 250 Cc. of water, and stir; filter when cold, rinse the dish with a little water, and add this to the filter. Add the diluted hydrochloric acid to the filtrate; then set aside for 24 hours; filter, wash the

contents of the filter with water until the washings no longer have an acid reaction, and add the washings to the filtrate. To this add gradually the monohydrated sodium carbonate, and, when the evolution of carbon dioxide has ceased, evaporate the liquid in a tared dish until it weighs 150 grammes; add the glycerin and continue the evaporation at the above named temperature until the weight of the extract is reduced to 125 grammes." < U. S.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

The Br. P. formula is very similar except in the addition of glycerin. Dose, 2 to 8 grains.

EXTRACTUM EUONYMI. U. S. Extract of Euonymus.

Extractum Euonymi Siccum. Br. Dry Extract of Euonymus.

The U. S. P. formula is:

Fluidextract of Euonymus, 100 Cc

Glycyrrhiza, (peeled Russian), in No. 40 powder,

A sufficient quantity to make 25 Gm.

"Evaporate the fluidextract of euonymus in a porcelain dish, by means of a water-bath, at a temperature not exceeding 70°C. (158°F.), with constant stirring, to complete dryness. Reduce the product to a fine powder, and add enough powdered glycyrrhiza to make the finished product weigh 25 grammes. Mix thoroughly." < U. S.

Average dose.—0.125 Gm.=125 milligrammes (2 grains).

The Br. P. formula is:

Euonymus Bark, in No. 20 powder, 20 ounces or 1000 Gm.

Alcohol, (45%), a sufficient quantity.

Calcium Phosphate, a sufficient quantity.

Exhaust the drug by percolating with the 45 percent. alcohol, and evaporate the alcohol; thoroughly dry the residue, powder the product as far as possible and mix it with one-fourth of its weight of calcium phosphate, continuing the drying and powdering until a satisfactory preparation is obtained; then immediately transfer it to a well-closed bottle. Dose, 1 to 2 grains.

EXTRACTUM GENTIANÆ. U. S., Br. Extract of Gentian.

The U. S. formula is:

Gentian, in No. 20 powder, 1000 Gm.

Water, a sufficient quantity.

"Moisten the powder with 400 Cc. of water, and let it macerate for 24 hours; then pack it in a conical percolator and gradually pour water upon it until the infusion passes but slightly imbued with the properties of gentian. Reduce the liquid to three-fourths of its bulk by boiling, and strain; then, by means of a water-bath, evaporate to a pilular consistence." < U. S.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

The Br. P. formula is:

"Infuse gentian in ten times its weight of distilled water for two hours: boil for fifteen minutes; pour off; press; strain; evaporate the liquid to the consistence of a soft extract." <Br. Dose, 2 to 8 grains.

EXTRACTUM GLYCYRRHIZÆ. U. S., Br.

Extract of Glycyrrhiza. U. S. Extract of Liquorice. Br.

"The commercial extract of the root *Glycyrrhiza glabra*, Linné; or of *Glycyrrhiza glandulifera*, Waldstein and Kitaibel (Fam. Leguminosæ)." <U. S.

Average dose.—1 Gm. (15 grains).

The Br. P. gives a formula for preparing this extract:

Liquorice root, in No. 20 powder, 1 pound (or 1000 grammes); distilled water, 4 Imperial pints (or 5 liters).

"Mix the liquorice root with 2 pints, Imp. (or 2½ liters) of the distilled water; set aside for 24 hours; strain; press; to the pressed marc add the remainder of the distilled water and set aside the mixture for 6 hours; strain; press; mix the strained liquids; heat to 212°F. (100°C.); strain through flannel, evaporate to the consistence of a soft extract." <Br.

EXTRACTUM GLYCYRRHIZÆ PURUM. U. S.

Pure Extract of Glycyrrhiza.

Glycyrrhiza, peeled, in No. 20 powder,	1000 Gm.
Ammonia Water,	150 Cc.
Glycerin,	
Water, each, a sufficient quantity.	

"Mix the ammonia water with 3000 Cc. of water, and, having moistened the powder with 1000 Cc. of the mixture, allow it to macerate in a closed vessel for 24 hours. Then pack it moderately in a cylindrical glass percolator and gradually pour upon it, first the remainder of the menstruum, and then water, until the glycyrrhiza is exhausted. Lastly, evaporate the liquid in a tared porcelain dish, by means of a water-bath, to a pilular consistence, and while the mass is still warm, incorporate with it 5 percent. of its weight of glycerin." <U. S.

Average dose.—1 Gm. (15 grains).

EXTRACTUM HÆMATOXYLI. U. S. Extract of Hematoxylon. [Logwood.].

Hematoxylon, rasped,	1000 Gm.
Water,	10000 Cc.

"Macerate the hematoxylon with the water for 48 hours. Then boil (avoiding the use of metallic vessels) until one-half of the water has evaporated; strain the decoction, while hot, and evaporate it to dryness." <U. S.

Average dose.—1 Gm. (15 grains).

EXTRACTUM HYOSCYAMI. U. S. Extract of Hyoscyamus.

Fluidextract of Hyoscyamus, 100 Cc.

"Evaporate the fluidextract of hyoscyamus in a porcelain dish, by means of a water-bath, at a temperature not exceeding 50°C. (122°F.), constantly stirring until it is reduced to a pilular consistence."

"When assayed by the process given it should not contain less than 0.3 percent. of mydriatic alkaloids. If the extract should be found, by the assay to contain more than this percentage, sufficient powdered sugar of milk should be added to reduce it to the standard of 0.3 percent." < U. S.

The assay process given in the U. S. P. is practically the same as for belladonna extract except that 10 Gm. Ext. of Hyoscyamus shall be taken instead of 5 Gm. of Ext. Belladonna Leaves, and the product shall be multiplied by 10 instead of 20. This extract is usually purchased by retail druggists from reliable manufacturers.

EXTRACTUM HYOSCYAMI VIRIDE. Br.

Green Extract of Hyoscyamus.

"Bruise fresh leaves, flowering tops, and young branches of *hyoscyamus niger*, Linn., press out the juice and heat it gradually to 130°F. (54.4°C.); separate the green coloring matter by a calico filter; heat the strained liquid to 200°F. (93.3°C.); filter; evaporate the filtrate to the consistence of a thin syrup; add to it the green coloring matter previously separated and passed through a hair sieve; stir the whole together, and evaporate at a temperature not exceeding 140°F. (60°C.), to the consistence of a soft extract." < Br.

Dose, 2 to 8 grains.

EXTRACTUM JALAPÆ. Br. Extract of Jalap.

Jalap, in coarse powder, 1 pound or 1000 grammes

Alcohol, (90%), 4 Imp. pints or 5 liters

Distilled Water, 1 Imp. gal. or 10 liters

"Macerate the powdered jalap in the alcohol for seven days; press out the tincture, filter, and then remove the alcohol by distillation, leaving a soft extract. Again macerate the residue of the jalap in the water for four hours; express; strain through flannel; evaporate to the consistence of a soft extract. Mix the two extracts, and evaporate at a temperature not exceeding 140°F. (60°C.), to the consistence of a firm extract." < Br. Dose, 2 to 8 grains.

EXTRACTUM KRAMERIÆ. U. S., Br.

Extract of Krameria. Extract of Rhatany.

The U. S. formula is:

Krameria, in No. 40 powder,

1000 Gm.

Water, a sufficient quantity.

"Moisten the powder with 300 Cc. of water, pack it in a conical percolator, and gradually pour water upon it until the infusion passes but slightly imbued with the astringency of the krameria. Heat the liquid to the boiling point, strain and evaporate the strained liquid by means of a water-bath, at a temperature not exceeding 70°C. (158°F.), to dryness." <U. S.

The Br. P. directs coarsely powdered krameria root to be macerated in twice its weight of distilled water for 24 hours; then to be packed in a percolator and percolated with distilled water until exhausted. The percolate is then to be evaporated to dryness. Dose, 5 to 15 grains.

EXTRACTUM LEPTANDRÆ. U. S. Extract of Leptandra.

[Culver's Root].

Fluidextract of Leptandra, 100 Cc.

Glycyrrhiza, (peeled Russian), in No. 80 powder,

A sufficient quantity to make 25 Gm.

"Evaporate the fluidextract of leptandra in a porcelain dish, by means of a water-bath, at a temperature not exceeding 70°C. (158°F.), with constant stirring, to complete dryness. Reduce the product to a fine powder and add enough powdered glycyrrhiza to make the finished product weigh 25 grammes. Mix thoroughly." <U. S.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

As thus prepared this extract represents four times the activity of the powdered leptandra root. The addition of the glycyrrhiza presents the extract in powdered form which is much more convenient than in mass for dispensing purposes.

EXTRACTUM MALTI. U. S. Extract of Malt.

This was official in the 1880 U. S. P. but was dismissed in the 1890 revision. It is now again made official.

Malt, in coarse powder, not finer

than No. 12, 1000 Gm. or 35¼ ounces av.

Water, a sufficient quantity.

"Upon the powder, contained in a suitable vessel, pour 1000 Cc. (or 35 ounces) of water, and macerate for six hours. Then add 4000 Cc. of water heated to about 30°C. (86°F.), and digest for an hour at a temperature not exceeding 55°C. (131°F.). Strain the mixture with strong expression. Finally, by means of a water-bath, or vacuum apparatus at a temperature not exceeding 55°C. (131°F.), evaporate the strained liquid rapidly to the consistency of thick honey."

"Extract of malt should be kept in well-closed vessels, in a cool place." <U. S.

Average dose.—16 Cc. (4 fl.drachms).

In making extract of malt it is necessary to begin the evaporation at once while the strained liquid or percolate is still hot, for upon this

depends the preservation of the diastase which is its important constituent. Manufacturers who supply this extract to the trade have continuous process apparatus, which, as the heated percolate is received evaporates it while still warm to the required consistence. Many combinations of Extract of Malt with other medicaments are prepared and will be noted under other headings.

EXTRACTUM NUCIS VOMICÆ. U. S., Br.

Extract of Nux Vomica.

The U. S. formula is:

Nux Vomica, in No. 20 powder,	1000 Gm.
Acetic Acid, Water, Alcohol,	
Sugar of Milk, dried and in fine powder,	
each, a sufficient quantity.	

"Mix 500 Cc. of acetic acid with 1300 Cc. of water, and, having moistened the powder with 400 Cc. of the mixture, pack it moderately in a cylindrical glass percolator; then add enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely cover the percolator, macerate for 48 hours. Then allow the percolation to proceed slowly, gradually adding, first, the remainder of the menstruum, and then water, until the percolate passes but faintly imbued with bitterness, and the nux vomica is exhausted. Reserve the first 750 Cc. of the percolate, and, having heated the remainder to boiling, filter, and evaporate the filtrate to a soft extract; dissolve this in the reserved portion, and add enough water to make the liquid measure 900 Cc. To the liquid thus obtained, add 3000 Cc. of alcohol, shake the mixture well, and set it aside for 24 hours, with occasional agitation. Filter the liquid through paper, and wash the residue in the filter with a mixture of alcohol 3 volumes and water 1 volume, until the washings are only faintly bitter. Evaporate the filtrate and washings in a porcelain dish, on a water-bath, to dryness. Determine by the method given the percentage of strychnine in the dry extract; ascertain by calculation the amount of strychnine in the remainder of the extract; add to this enough well-dried sugar of milk to bring the quantity of strychnine in the final dry extract of nux vomica to 5 percent. of the total weight; and, when thoroughly powdered and mixed, transfer the extract to small, well-stoppered vials."

"Extract of Nux Vomica, when assayed by the process given, should be found to contain 5 percent. of strychnine." < U. S.

Average dose.—0.015 Gm.=15 milligrammes ($\frac{1}{4}$ grain).

An assay process is given in the U. S. P. but, as it requires careful manipulation and calculation it is seldom used by retail druggists; they depending chiefly upon reliable manufacturers for this extract.

EXTRACTUM OPII. U. S., Br. Extract of Opium.

The U. S. formula is:

Powdered Opium, 100 Gm.

Sugar of Milk, recently dried and in fine powder,

Water, each, a sufficient quantity.

"Rub the powdered opium in a mortar into a smooth paste with 250 Cc. of water; then transfer to a bottle of the capacity of 1000 Cc., wash the mortar with 750 Cc. of water in successive portions, and add the washings to the contents of the bottle. Cork the bottle and shake it vigorously once every 2 hours during 12 hours. Then filter through a rapidly acting double filter, and pour water on the magma slowly, until the filtrate passes nearly colorless and only faintly bitter.

Concentrate the filtrate and washings in a tared dish, on a water-bath, until the contents weigh about 200 grammes, and allow the extract to become cold. Then weigh it accurately, transfer 12 grammes to an Erlenmeyer flask having a capacity of about 100 Cc., and determine in this portion the amount of morphine by the process of assay given, using the same quantity of liquids as there directed for 4 grammes of the dry extract. In another portion of 5 grammes determine the amount of water by drying it in a flat-bottomed dish, at 100°C. (212°F.), until it ceases to lose weight. From the results thus obtained, ascertain by calculation the amount of morphine and of water contained in the remainder of the extract, add to this enough well-dried sugar of milk to bring the quantity of morphine in the final dry extract to 20 percent., then evaporate the whole to dryness; reduce it to powder, and transfer it to small well-stoppered vials."

<U. S.

Average dose.—0.030 Gm.=30 milligrammes ($\frac{1}{2}$ grain).

An assay process for this extract is given in the U. S. P. but, as it requires careful manipulation and calculation it is seldom used by retail druggists; they depending chiefly upon reliable manufacturers for this extract.

The Br. P. describes Extract of Opium as "An extract containing 20 percent. of morphine," and gives the following formula for its preparation:

Opium, sliced, 1 pound or 1000 grammes

Distilled Water, 120 fl.ounces or $7\frac{1}{2}$ liters

"Set aside the sliced opium with one-third of the distilled water for 24 hours; express the liquid; thoroughly mix the residue of the opium with another third of the distilled water; set aside for 24 hours; express; repeat the operation with the remaining third of the distilled water; mix the liquids; strain through flannel; evaporate to about half a pound (or 500 grammes)." <Br.

This extract is to be tested and so regulated by mixing with a stronger extract if deficient, or by dilution with milk sugar if too

strong, that its percentage of morphine shall be 20 percent. Dose, $\frac{1}{4}$ to 1 grain.

EXTRACTUM PHYSOSTIGMATIS. U. S., Br.

Extract of Physostigma. U. S. Extract of Calabar Bean. Br.

Physostigma, in No. 80 powder, 1000 Gm.

Alcohol,

Glycyrrhiza, (peeled, Russian), in No. 80 powder,
each, a sufficient quantity.

"Moisten the physostigma with 400 Cc. of alcohol, and pack it firmly in a cylindrical percolator; then add enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 48 hours. Then allow the percolation to proceed gradually, adding alcohol, until 3000 Cc. of percolate are obtained, or the physostigma is exhausted. Reserve the first 900 Cc. of the percolate, and evaporate the remainder at a temperature not exceeding 50°C. (122°F.), to 100 Cc.; mix this with the reserved portion and evaporate at or below the above mentioned temperature, on a water-bath, to dryness. Remove 1 Gm. of the extract and assay this by the process given; from the results thus obtained, ascertain by calculation the amount of ether-soluble alkaloids contained in the remainder of the extract, add to this enough powdered glycyrrhiza to bring the quantity of the alkaloids in the finished product to 2 percent., reduce to powder, mix thoroughly, and transfer it at once to well-stoppered, amber-colored vials."

"Extract of Physostigma, when assayed by the process given, should be found to contain 2 percent. of ether-soluble alkaloids."
<U. S.

Average dose.—0.008 Gm.=8 milligrammes ($\frac{1}{8}$ grain).

An assay process for this extract is given in the U. S. P. but, as it requires careful manipulation and calculation, it is seldom used by retail druggists; they depending chiefly upon reliable manufacturers for this extract.

The Br. P. formula for Extract of Calabar Bean is:

Calabar Bean, in No. 40 powder, 1 pound or 1000 grammes

Alcohol, (90%), 80 fl.ounces or 5 liters

Milk Sugar, in fine powder, a sufficient quantity.

"Mix the powdered calabar bean with 20 fl.ounces (or 1250 Cc.) of the alcohol; set aside in a closed vessel for 48 hours, agitating occasionally; transfer to a percolator; when the liquid ceases to pass, add the remaining alcohol, so that it may slowly percolate through the powder; remove the marc and subject it to pressure; add the expressed liquid to the percolate; filter; recover most of the alcohol by distillation; transfer the residue to a counter-poised basin, and evapor-

ate to the consistence of a very soft extract; weigh; then add three times its weight of milk sugar and mix thoroughly to produce a firm extract." < Br.

Dose, $\frac{1}{4}$ to 1 grain.

EXTRACTUM QUASSIÆ. U. S. Extract of Quassia.

Quassia, in No. 20 powder, 1000 Gm.

Water,

Sugar of Milk, recently dried and in fine powder,
a sufficient quantity to make 100 Gm.

"Moisten the quassia with 400 Cc. of water, pack it firmly in a conical percolator, and gradually pour water upon it until the infusion passes but slightly imbued with bitterness. Reduce the liquid to three-fourths of its bulk by boiling and strain; then evaporate by means of a water-bath to dryness and add enough sugar of milk to make the extract weigh 100 grammes. Mix thoroughly, reduce to fine powder, and transfer to well-stoppered bottles." < U. S.

Average dose.—0.065 Gm.=65 milligrammes (1 grain).

As thus prepared this extract represents ten times the medicinal activity of quassia wood.

EXTRACTUM RHAMNI PURSHIANÆ. U. S.

Extract of Cascara Sagrada. Extractum Cascaræ Sagradæ. Br.

The U. S. formula is:

Cascara Sagrada, in No. 60 powder, 1000 Gm.

Alcohol, Water,

Glycyrrhiza, (peeled, Russian), in No. 80 powder,
each, a sufficient quantity to make 250 Gm.

"Mix 125 Cc. of alcohol with 875 Cc. of water, and, having moistened the powder with 400 Cc. of the mixture, pack it firmly in a cylindrical percolator; then add enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 48 hours. Then allow the percolation to proceed gradually, adding menstruum, using the same proportions of alcohol and water as before, until the drug is exhausted. Reserve the first 850 Cc. of the percolate, and evaporate the remainder on a water-bath at a temperature not exceeding 70°C. (158°F.), to the consistence of a syrup. Mix this with the reserved portion and continue the evaporation at or below the above named temperature, to dryness. Reduce the extract to fine powder, and add enough powdered glycyrrhiza to make the product weigh 250 grammes. Mix thoroughly." < U. S.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

As thus prepared this extract represents four times the medicinal activity of the powdered cascara bark. It is considerably used in the form of pills, and compounded with other tonic laxatives.

For the Br. P. formula see *Extractum Cascaræ Sagradæ*.

EXTRACTUM RHEI. U. S., Br. Extract of Rhubarb.

The U. S. P. formula is:

Fluidextract of Rhubarb, 100 Cc.
(or any convenient quantity).

"Evaporate the fluidextract of rhubarb in a porcelain dish, by means of a water-bath, with constant stirring, at a temperature not exceeding 50°C. (122°F.), to a pilular consistence." < U. S.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

The Br. P. formula is:

"Moisten rhubarb root, in No. 20 powder, with alcohol (60%), and set aside for 48 hours; transfer to a percolator; slowly pass as much of the alcohol as may be sufficient to exhaust the rhubarb root. Remove most of the alcohol by distillation, and evaporate the residual liquid to dryness." < Br.

Dose, 2 to 8 grains.

Extract of Rhubarb is used chiefly in the form of pills as a laxative and stomachic.

Extractum Rheum Compositum. Ph. Ger. Compound Extract of Rhubarb.

Extract of rhubarb, 6 parts; extract of aloes, 2 parts; resin of jalap, 1 part; medicinal soap, 4 parts. Rub them together and having moistened the mixture with diluted alcohol, evaporate to a dry extract by means of a steam-bath.

This extract is a favorite purgative in several European countries, and is official in several pharmacopœias. It may be readily made into pills.

EXTRACTUM SCOPOLÆ. U. S. Extract of Scopolia.

Fluidextract of Scopolia, 100 Cc.
(or any convenient quantity).

"Evaporate the fluidextract of scopolia in a porcelain dish, by means of a water-bath, at a temperature not exceeding 50°C. (122°F.), with constant stirring, to a pilular consistence."

"When assayed as directed, Extract of Scopolia should contain 2 percent. of mydriatic alkaloids. If the extract should be found by the assay to contain more than this percentage, sufficient powdered sugar of milk should be added to reduce it to the standard of 2 percent." < U. S.

An assay process is given in the U. S. P. similar to the process directed for extract of belladonna leaves, but differing in quantity.

Retail druggists seldom assay this extract but depend upon reliable manufacturers to furnish it. Its uses are similar to belladonna extract.

EXTRACTUM STRAMONII. U. S., Br. Extract of Stramonium.

The U. S. P. formula is:

Fluidextract of Stramonium, 100 Cc.
(or any convenient quantity).

"Evaporate the fluidextract of stramonium in a porcelain dish, by means of a water-bath, at a temperature not exceeding 50°C. (122°F.), with constant stirring, to a pilular consistence."

"When assayed as directed, extract of stramonium should contain 1.4 percent. of mydriatic alkaloids. If the extract should be found by the assay to contain more than this percentage, sufficient powdered sugar of milk should be added to reduce it to the standard of 1.4 percent." < U. S.

The assay process directed in the U. S. P. is the same as that given for extract of belladonna leaves, using 5 grammes of extract of stramonium.

Average dose.—0.010 Gm.=10 milligrammes ($\frac{1}{5}$ grain).

The Br. P. formula is:

"Pack stramonium seeds, in No. 40 powder, in a percolator; exhaust the powder by slow percolation with alcohol (70%); remove most of the alcohol from the percolate by distillation; evaporate the residual liquid to a firm extract." < Br. Dose, $\frac{1}{4}$ to 1 grain.

It should be noted that the present U. S. official extract of stramonium, being prepared from the fluidextract of stramonium leaves, differs from the formerly official U. S. and the present Br. extract of stramonium prepared from stramonium seeds.

Extract of stramonium is used chiefly in the form of pills as an antispasmodic, or in the form of pastilles for asthma.

EXTRACTUM STROPHANTHI. Br. Extract of Strophanthus.

Strophanthus Seeds, in No. 30 powder, and dried,
25 Gm. or 1 ounce

Purified Ether, Alcohol, (90%), Milk Sugar,
of each, a sufficient quantity.

"Pack the dry powder in a percolator, and having moistened it with ether, macerate 24 hours; then allow percolation to proceed, continuing the additions of the ether until the liquid passes through colorless. Remove the marc from the percolator and dry it, gradually heating it to 120°F. (49.9°C.). Again reduce it to a powder, repack in the percolator and moisten with the alcohol. Macerate for 48 hours, then pour on successive quantities of the alcohol, percolating slowly, until half a pint (or 250 Cc.) of the liquid is obtained. Evaporate most of the alcohol; transfer the residual liquid to a counterpoised

basin; concentrate until the liquid begins to thicken; then add sufficient finely powdered milk sugar to produce 2 ounces (or 50 Gm.) of extract, in powder." <Br. Dose, $\frac{1}{4}$ to 1 grain.

EXTRACTUM SUMBUL. U. S. Extract of Sumbul.

Fluidextract of Sumbul, 100 Cc.
(or any convenient quantity).

"Evaporate the fluidextract of sumbul in a porcelain dish, by means of a water-bath, at a temperature not exceeding 70°C. (158°F.), with constant stirring, to a pilular consistence." <U. S.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

EXTRACTUM TARAXACI. U. S., Br. Extract of Taraxacum.

[Extract of Dandelion].

The U. S. P. formula is:

Taraxacum, in No. 30 powder, 1000 Gm.
Alcohol,

Water, each, a sufficient quantity.

"Mix 125 Cc. of alcohol with 875 Cc. of water, and, having moistened the powder with 250 Cc. of the mixture, pack it in a cylindrical percolator; then add enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 24 hours. Then allow the percolation to proceed gradually, adding menstruum, using the same proportions of alcohol and water as before, until the taraxacum is exhausted. Evaporate the percolate, by means of a water-bath, to a pilular consistence." <U. S.

Average dose.—1 Gm. (15 grains).

The Br. P. formula is:

"Crush fresh taraxacum root; press out the juice; allow the feculence to subside; heat the liquid to 212°F. (100°C.), and maintain the temperature for ten minutes; strain; evaporate to the consistence of a soft extract." <Br. Dose, 5 to 15 grains.

It will be noticed that the taraxacum extract of the U. S. P. is prepared from the dried root, while the Br. P. extract is prepared from the juice of the fresh root; they are, therefore, dissimilar.

Extract of Dandelion or Taraxacum is more used than most of the extracts and is a favorite ingredient of laxative and liver pills. Its effectiveness in the quantities used for such combinations may be doubted, but it is nevertheless a good ingredient in a pill mass.

FEL BOVIS. U. S. Oxgall.

"The fresh bile of *Bos taurus*, Linné." <U. S.

The natural bile obtained from the gall bladder of the ox. A brownish-green, or dark green, somewhat viscid liquid, having a peculiar,

unpleasant odor, and a disagreeable taste. Sp. gr. 1.015 to 1.025 at 25°C. (77°F.). It is neutral, or has a faint alkaline action.

In its natural state this liquid soon decomposes, but may be kept by adding to it $\frac{1}{4}$ its volume of alcohol.

FEL BOVIS PURIFICATUM. U. S. Purified Oxgall.

Oxgall,	300 Cc. or 16 fl.ounces
Alcohol,	100 Cc. or $5\frac{1}{3}$ fl.ounces

“Evaporate the oxgall, in a tared porcelain dish, on a water-bath, to about 100 grammes, then add to it the alcohol, mix the whole thoroughly, and set it aside, well-covered, for 3 or 4 days. Then decant the clear solution, filter the remainder, and, having mixed the liquids and distilled off the alcohol, evaporate the residue to a pilular consistence.” < U. S.

Average dose.—0.500 Gm.=500 milligrammes ($7\frac{1}{2}$ grains).

Fel Bovis Inspissatum. Inspissated oxgall or bile was formerly official in the U. S. P. It was prepared by heating fresh oxgall 100 parts (or 10 ounces) to a temperature not exceeding 80°C. (176°F.); straining through muslin, evaporating the strained liquid on a water-bath to 15 parts (or $1\frac{1}{2}$ ounce). This was used like the above, chiefly as an ingredient of pills, the dose being 5 to 15 grains.

FEL BOVINUM PURIFICATUM. Br. Purified Ox Bile.

“Evaporate 20 fl.ounces (or 500 Cc.) of fresh ox bile to one-quarter of its volume; shake it with 10 fl.ounces (or 250 Cc.) of alcohol (90%); set the mixture aside until the solid matter has subsided; decant the clear solution, and filter the remainder, washing the filter and contents with a little more alcohol (90%). Distil off most of the alcohol from the mixed liquids, and evaporate the residue in a porcelain dish, by the heat of a water-bath, until it acquires the consistence of a thick extract.” < Br. Dose, 5 to 15 grains.

FERRUM — IRON.

Symbol, Fe; Atomic weight (O=16) 55.85; Sp. gr. 7.84.

Iron is the most useful, abundant, and widely distributed of the metals, and in pharmacy, as well as in the arts, holds the first place for utility and value.

It occurs in nature in the form of ores, and is only prepared in metallic form on a large scale. It melts at about 3300°F. Treated with carbon it forms steel. It combines chemically with all the non-metals except hydrogen and nitrogen, and with most of the metals and the acids, forming a great variety of important salts.

In the metallic state iron is employed in pharmacy in the form of fine bright annealed iron wire, which is chosen on account of its purity and cheapness. Reduced iron in the form of powder is also employed

for some purposes. In manufacturing chemicals in a large way coarser iron is used, and the salts obtained purified by various means. Iron is the base of two important series of salts, ferrous and ferric, in the former acting as a dyad and in the latter as a hexad. It is more fully noticed in the Chemical Section, Part I.

Ferrum Pulveratum. Powdered Iron. This is official in some of the European pharmacopœias, and is considerably used in European countries. It is made from good cast iron and contains some carbon. It is known as *Limatura Martis Præparata*.

FERRI ARSENAS. Br. Iron Arsenate.

"Ferrous arsenate, $\text{Fe}_3(\text{AsO}_4)_2$, $6\text{H}_2\text{O}$, with ferric arsenate and some iron oxide." < Br.

The Br. P. formula is as follows:

Ferrous Sulphate,	415 Gm. or $20\frac{3}{4}$ ounces av.
Sodium Arsenate,	530 Gm. or $26\frac{1}{2}$ ounces av.
Sodium Bicarbonate,	90 Gm. or $4\frac{1}{2}$ ounces av.
Distilled Boiling Water,	a sufficient quantity.

"Dissolve the sodium arsenate in about 100 ounces (or 2 liters) and the ferrous sulphate in about 120 ounces (or 2400 Cc.) of the distilled water; mix the two solutions; add the sodium bicarbonate dissolved in a little cold distilled water; stir thoroughly; collect the resulting precipitate on a calico filter; wash until free from sulphates; squeeze the washed precipitate between folds of strong linen in a screw-press; dry it on porous bricks in a warm air-chamber, the temperature of which does not exceed 100°F . (37.8°C)." < Br. Dose, $\frac{1}{16}$ to $\frac{1}{4}$ grain.

FERRI CARBONAS SACCHARATUS. U. S., Br.

Saccharated Ferrous Carbonate or Saccharated

Carbonate of Iron.

"Saccharated Ferrous Carbonate should contain not less than 15 percent. of Ferrous Carbonate [$\text{FeCO}_3=115.05$], and should be kept in well-stoppered bottles." < U. S.

The U. S. formula is:

Ferrous Sulphate,	50 Gm. or 10 ounces
Sodium Bicarbonate,	35 Gm. or 7 ounces
Sugar, in fine powder,	
Distilled Water, of each,	a sufficient quantity.

The ferrous sulphate is to be dissolved in 2000 Cc. (or 40 fl.ounces) of hot distilled water, and the sodium bicarbonate in 500 Cc. (or about 6 pints) of warm distilled water. The solutions are to be filtered separately while hot, and the iron solution gradually added to the solution of the sodium salt, and the resultant precipitate washed with boiling distilled water until the washings give no reaction with test solution of barium chloride. The precipitate is then to be collected,

drained quickly and pressed, and mixed with 80 Gm. (or 16 ounces) of sugar in a porcelain capsule, then evaporated by means of a water-bath to dryness, reduced to powder and enough powdered sugar mixed with it if necessary, to make the product weigh 160 Gm. (or 20 ounces), and be kept in small, well-stoppered bottles.

The Br. P. directs ammonium carbonate instead of sodium bicarbonate, but the resulting preparation is the same.

This should not be mistaken for the Iron Subcarbonate, also called Iron Carbonate, which was formerly official.

Uses. This salt is used as an iron tonic, in doses of from 5 to 30 grains.

Average dose.—0.250 Gm.=250 milligrammes (4 grains). U. S.

FERRI CHLORIDUM. U. S. Chloride of Iron. Ferric Chloride.

“Ferric Chloride should contain not less than 22 percent. of metallic iron in the form of chloride.” <U. S.

Solution of Ferric Chloride,

100 Gm.

To make

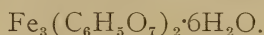
40 Gm.

“Evaporate the solution of ferric chloride on a water-bath until it weighs 40 grammes; then set it aside in a glass-covered vessel, until it forms a crystalline mass. Lastly, break the salt into pieces, and keep it in glass-stoppered bottles, protected from light.” <U. S.

Uses. This salt is used externally as a styptic and in solution as an application for sore throat, diphtheritic growths, ulcers etc. Also as a tonic, in doses of 3 to 5 grains.

Average dose.—0.065 Gm.=65 milligrammes (1 grain).

FERRI CITRAS. U. S. Iron Citrate. Ferric Citrate.



“It should contain Ferric Citrate corresponding in amount to not less than 16 percent. of metallic iron, and should be kept in well-stoppered bottles, protected from light.” <U. S.

The following formula was given in a former revision:

Solution of citrate of iron, a convenient quantity. The solution is to be evaporated on a water-bath at a temperature not exceeding 60°C. (140°F.), to the consistence of syrup and spread upon plates of glass so that, when dry, it may be obtained in scales.

It is slowly soluble in cold water, readily soluble in hot water, but insoluble in alcohol.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

FERRI ET AMMONII CITRAS. U. S., Br.

Iron and Ammonium Citrate. Soluble Citrate of Iron.

“It should contain Iron and Ammonium Citrate corresponding in amount to not less than 16 percent. of metallic iron, and should be kept in well-stoppered bottles, protected from light.” <U. S.

The U. S. P. directs this to be prepared from the U. S. official solution of ferric citrate by mixing 1000 Cc. (or 16 fl.ounces) with 40 Cc. (or 6.4 fl.ounces) of ammonia water and evaporating the mixture at a temperature not exceeding 60°C. (140°F.), to the consistence of a syrup, which is to be spread upon glass, so that, when dry, the salt may be obtained in scales. It is more commonly known as soluble iron citrate and should be used in making elixirs, syrups, and all preparations in which a soluble iron citrate salt is desired.

Uses. This is the soluble iron salt which is employed for nearly all purposes, except making pills. The dose is from 5 to 20 grains.

Average dose.—250 Gm.=250 milligrammes (4 grains).

The Br. P. formula, while it produces an identical preparation, is entirely different and is therefore given in full:

“Solution of ferric sulphate, 10 fl.ounces (or 200 Cc.); solution of ammonia, 23 fl.ounces (or 400 Cc.); citric acid, 4 ounces (or 80 Gm.); distilled water, a sufficient quantity.

Prepare ferric hydrate as follows: Mix 16 fl.ounces (or 320 Cc.) of the solution of ammonia with 40 ounces (or 800 Cc.) of distilled water; gradually add to this the solution of ferric sulphate, previously diluted with 40 ounces (or 800 Cc.) of distilled water; stir constantly and briskly, taking care that the ammonia is finally in slight excess as indicated by the odor; set aside the mixture for 2 hours, stirring it occasionally; pour it on a calico filter; when the liquor has drained away, wash the precipitated ferric hydroxide with distilled water until free from sulphates.

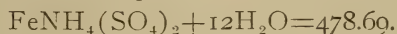
Dissolve the citric acid in its own weight of distilled water; warm the mixture on a water-bath; add the ferric hydroxide, previously well-drained; stir them together until nearly the whole of the hydroxide has dissolved, or until the citric acid is saturated with ferric hydroxide (prepared if necessary, from more of the solution of ferric sulphate); let the solution cool; add 5½ fl.ounces (or 110 Cc.) of solution of ammonia; filter through flannel, adding some distilled water if necessary; evaporate to the consistence of syrup, the presence of a very slight excess of ammonia being maintained; dry in thin layers on flat porcelain or glass plates at a temperature not exceeding 100°F. (37.8°C.); remove the dry flakes of iron and ammonium citrate. Dose, 5 to 10 grains.” <Br.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

FERRI ET AMMONII SULPHAS. U. S.

Ferric Ammonium Sulphate. Iron and Ammonium Sulphate.

Ammonio-Ferric Sulphate. Ammonio-Ferric Alum.



“It should contain, in the uneffloresced condition, 99.5 percent. of pure Ferric Ammonium Sulphate, and not less than 11.5 percent. of

metallic iron. It should be kept in well-stoppered bottles, protected from light." <U. S.

No process for making this salt is now official, but it may be prepared by heating a pint of solution of ferric sulphate to boiling and adding to it 2½ ounces av. of ammonium sulphate, stirring until dissolved and setting aside to crystallize. This salt readily deliquesces in warm weather. It is used as a styptic, generally in solution. It is soluble in 3 parts of water at N. T., and in 0.8 part of boiling water. It is insoluble in alcohol.

Average dose.—0.500 Gm.=500 milligrammes (7½ grains).

FERRI ET AMMONII TARTRAS. U. S.

Iron and Ammonium Tartrate. Ammonio-Ferric Tartrate.

"It should contain Iron and Ammonium Tartrate corresponding in amount to not less than 13 percent. of metallic iron, and should be kept in well-stoppered bottles, protected from light." <U. S.

The following formula was given in a former revision:

Solution of ferric sulphate, 100 Cc. (or 10 fl.ounces); tartaric acid, 29 Gm. (or 3 ounces av.); distilled water, 200 Cc. (or 20 fl.ounces); ammonia water, and water, of each, a sufficient quantity. Ammonia water, 110 Cc. (or 11 fl.ounces), is to be diluted with 250 Cc. (or 25 fl.ounces) of cold water, and to the mixture is to be added slowly and with constant stirring, the solution of ferric sulphate, previously diluted with 1300 Cc. (or 130 fl.ounces) of cold water. The precipitate is allowed to subside and the clear liquid drawn off with a siphon, and the precipitate washed repeatedly by pouring on fresh water and drawing off the clear liquid after the precipitate has subsided. The precipitate is then to be transferred to a muslin strainer and expressed as dry as possible. One-half of the tartaric acid is then to be dissolved in the distilled water, the solution exactly neutralized with the ammonia, the remaining half of the tartaric acid added and dissolved with the aid of gentle heat. The moist ferric sulphate is then to be added in portions, stirring constantly and continuing the heat, which should not exceed 60°C. (140°F.), until the hydrate is dissolved. The solution is to be filtered while hot, and the filtrate evaporated to the consistence of syrup and spread upon plates of glass, so that, when dry, the salt may be obtained in scales. <U. S.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

FERRI ET POTASSII TARTRAS. U. S.

Iron and Potassium Tartrate. Potassio-Ferric Tartrate. U. S.

Ferrum Tartaratum. Br. Tartarated Iron.

"It should contain Iron and Potassium Tartrate corresponding in amount to not less than 15 percent. of metallic iron, and should be kept in well-stoppered bottles, protected from light." <U. S.

The following formula was given in a former revision:

Solution of ferric sulphate, 100 Cc. (or 10 fl.ounces); potassium bitartrate, 38 Gm. (or 4 ounces av.); distilled water, 300 Cc. (or 30 fl.ounces); ammonia water, and water, of each, a sufficient quantity. The ferric hydrate precipitate is formed and washed in the same general manner as in the preceding formula. The potassium tartrate is dissolved in the distilled water by the aid of heat, and the moist ferric hydrate dissolved in the solution as in the preceding formula. The solution is filtered and the filtrate allowed to stand in a cool place for 24 hours, during which a precipitate forms. It is then stirred and enough ammonia water carefully added to just dissolve the precipitate. It is then evaporated and a scale salt prepared as directed in the foregoing formula. <U. S.

This is a mild ferruginous tonic. Dose 10 to 30 grains.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

This is official in the Br. P. under the Latin title *Ferrum Tartaratum*, common title, Tartarated Iron. It is prepared in a similar manner as the foregoing.

FERRI ET QUININÆ CITRAS. U. S., Br.

Iron and Quinine Citrate.

"It should contain not less than 11.5 percent. of dried quinine, and ferric citrate corresponding to not less than 13.5 percent. of metallic iron. It should be kept in well-stoppered bottles, protected from light." <U. S.

A formula for this preparation was formerly official in the U. S. P. It was as follows:

Ferric citrate, 85 Gm. (or 8½ ounces); quinine, dried at 100°C. (212°F.), to a constant weight, 12 Gm. (or 1½ ounces); citric acid, 3 Gm. (or 0.3 ounce); distilled water, a sufficient quantity to make 100 Gm. (or 10 ounces). The citrate of iron is to be dissolved on a water-bath at a heat not exceeding 60°C. (140°F.), in 160 Cc. (or 16 ounces) of distilled water. To this solution the quinine and citric acid, previously triturated with 20 Cc. (or 2 ounces) of water, are to be added and stirred until they are dissolved. The solution is then to be evaporated at the above mentioned temperature to the consistency of syrup and spread upon glass plates to dry, so that a scale salt may be produced. <U. S.

An assay process is given in the U. S. P. but, as this salt is seldom prepared by retail druggists, it is not repeated here. The assay process provides for the test of the quinine and the iron contents and corresponds to the general official tests for these constituents. The retail druggists generally depend upon a reliable manufacturer for their supply of this salt, therefore the assay tests are not repeated.

Uses. This salt contains 12 percent. of quinine, is not very soluble, and is much used for making bitter wine of iron and other tonics, and for making pills.

The Br. P. directs ferric hydroxide to be prepared from 9 fl.ounces (or 200 Cc.) of solution of ferric sulphate as directed under *Ferri et Ammonii Citras*.

Quinine sulphate, 2 ounces av., (or 40 Gm.) is then to be mixed with 8 times its weight of distilled water and sufficient sulphuric acid added gradually to dissolve it. It is then to be precipitated by adding solution of ammonia to slight excess, and the precipitate collected on a filter and washed with 60 ounces (or 1200 Cc.) of distilled water. This produces quinine (alkaloid).

Average dose.—0.125 Gm.=125 milligrammes (2 grains).

Citric acid, 6 ounces av.+60 grains (or 123 Gm.) is then to be dissolved in its own weight of distilled water, and the solution warmed on a water-bath. The moist ferric hydroxide, well-drained, is then to be added to the warm solution, and when it has dissolved the quinine alkaloid is added and dissolved. The solution is then allowed to cool, and solution of ammonia, 3 fl.ounces (or 60 Cc.), diluted with 4 fl.ounces (or 80 Cc.) of distilled water is added, a little at a time. The solution is then filtered and evaporated to the consistency of a thin syrup, which is poured upon porcelain or glass plates and dried at a temperature of 100°F. (37.8°C.); the product being flakes or scales of iron and quinine citrate.

FERRI ET QUININÆ CITRAS SOLUBILIS. U. S.

Soluble Iron and Quinine Citrate.

"It should contain not less than 11.5 percent. of dried quinine, and ferric citrate corresponding in amount to not less than 13.5 percent. of metallic iron. It should be kept in well-stoppered bottles, protected from light." <U. S.

The ingredients directed in this formula are the same as in the preceding, except that ammonia water, a sufficient quantity, is added and the manipulation the same until the quinine and citric acid are dissolved. Then there is added, gradually, and with constant stirring, 50 Cc. (or 5 fl.ounces) of ammonia water, or a sufficient quantity, so that after adding each portion of the latter the precipitated quinine will be redissolved, and the liquid acquire a greenish-yellow tint. This solution is then evaporated to the consistence of a syrup and spread on plates of glass so as to make a scale salt when dry.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

Citrate of Iron, Quinine and Strychnine is not an official salt, but may be made by adding one part, or 44 grains, of strychnine (alkaloid) to the U. S. formula, at the same time the quinine is added. This contains 12 percent. of quinine and 1 percent. of strychnine. It is sometimes used for making elixirs or syrups of iron, quinine and strychnine, and in making pills.

This scale salt and citrate of iron and quinine, as found in the market, contain generally only 10 percent. of quinine.

FERRI ET STRYCHNINÆ CITRAS. U. S.**Citrate of Iron and Strychnine.**

"It should contain not less than 0.9, nor more than 1 percent. of strychnine, and ferric citrate corresponding in amount to not less than 16 percent. of metallic iron. It should be kept in well-stoppered bottles, protected from light." <U. S.

A formula for this preparation was formerly official in the U. S. P. It was as follows:

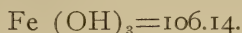
Iron and Ammonium Citrate,	98 Gm. or 490 grains
Strychnine,	1 Gm. or 5 grains
Citric Acid,	1 Gm. or 5 grains
Distilled Water,	120 Cc. or 11 fl.drachms

The iron and ammonium citrate is to be dissolved in the water and the strychnine and citric acid rubbed together with 20 Cc. (or 2 Gm.) of distilled water. The two solutions are to be mixed and the solutions to be evaporated at a temperature not exceeding 60°C. (140°F.), to the consistency of a syrup and spread upon glass plates to make a scale salt when dry. <U. S.

This salt is readily soluble in water but only partially soluble in alcohol.

Average dose.—0.125 Gm.=125 milligrammes (2 grains).

An assay process is given in the U. S. P., but, as this salt is seldom prepared by retail druggists, it is not repeated here. The assay process provides for the test of the strychnine and the iron contents, and corresponds to the general official tests for these constituents. The retail druggists generally depend upon reliable manufacturers for their supply of this salt, therefore the assay tests are not repeated.

FERRI HYDROXIDUM. U. S. Ferric Hydroxide.

[Ferri Oxidum Hydratum, Pharm. 1890].

Solution of Feric Sulphate,	100 Cc.
Ammonia Water,	138 Cc.
Water, a sufficient quantity.	

"To the ammonia water, previously diluted with 500 Cc. of cold water, add, with constant stirring, the solution of ferric sulphate, previously diluted with 1000 Cc. of cold water. As soon as the precipitate has subsided, draw off the clear liquid by means of a siphon, then mix the precipitate intimately with about 1000 Cc. of cold water, draw off again the clear liquid after subsidence of the precipitate and repeat this operation until a portion of the decanted liquid gives not more than a slight cloudiness with barium chloride test solution. Finally transfer the precipitate to a wet muslin strainer, and, after it has drained, mix it with sufficient cold water to make the mixture weigh 300 grammes." <U. S.

This is what has been formerly known as Hydrated Oxide of Iron, a preparation formerly kept on hand by druggists as an antidote for arsenic poisoning, but now quite generally superseded by the following, which may be quickly prepared and is just as effective as an antidote.

FERRI HYDROXIDUM CUM MAGNESII OXIDO. U. S.

Ferric Hydroxide with Magnesium Oxide. Arsenic Antidote.

Solution Ferric Sulphate,

40 Cc. or 1 fl.ounce + 169 minims

Magnesium Oxide,

10 Gm. or

154 grains

Water, a sufficient quantity.

"Mix the solution of ferric sulphate with 125 Cc. (or $4\frac{1}{4}$ fl.ounces) of water and keep the liquid in a large well-stoppered bottle."

"Rub the magnesium oxide with cold water to a smooth and thin mixture, transfer this to a bottle capable of holding about 1000 Cc. and fill it with water to about three-fourths of its capacity.

"When the preparation is wanted for use, shake the magnesium oxide mixture to a homogeneous, thin magma, add it gradually to the diluted solution of ferric sulphate, and shake them together until a uniform smooth mixture results." < U. S.

Note. "For the rapid preparation of this antidote to arsenical poisoning, the diluted solution of ferric sulphate, and the mixture of magnesium oxide with water, should always be kept on hand, in separate bottles ready for immediate use.

Average dose.—Arsenical antidote, 120 Cc. (4 fl.ounces).

FERRI HYPOPHOSPHIS. U. S.

Iron Hypophosphite. Ferric Hypophosphite.

$\text{Fe} (\text{PH}_2\text{O}_2)_3 = 249.09.$

"It should contain not less than 98 percent. of pure Ferric Hypophosphite, $[(\text{PH}_2\text{O}\cdot\text{O})_3\text{Fe}]$, and should be kept in well-stoppered bottles." < U. S.

No official process is given for making this salt; but the most convenient method is by the double decomposition of iron sulphate and calcium hypophosphite. 480 grains of pure ferrous sulphate in crystals is dissolved in a pint of hot water and the solution added to a solution of 326 grains of calcium hypophosphite in a pint of cold water. Calcium sulphate is precipitated and ferrous hypophosphite held in solution; the solution is evaporated and the ferrous becomes a ferric salt, known as iron hypophosphite.

Uses. This salt is given in the form of pills or powders, and is considerably used in making solutions and syrups of the hypophosphites, but is not very soluble. The dose is 3 to 10 grains.

FERRI PHOSPHAS. Br. Iron Phosphate.

"A powder containing not less than 47 percent. of hydrous ferrous phosphate, $\text{Fe}(\text{PO})_4 \cdot 8\text{H}_2\text{O}$, with ferric phosphate and some iron oxide." < Br.

Sodium Bicarbonate, $\frac{3}{4}$ ounce av. or 15 Gm.

Sodium Phosphate, $2\frac{3}{4}$ ounces av. or 55 Gm.

Ferrous Sulphate, 3 ounces av. or 60 Gm.

Distilled Water, boiling, a sufficient quantity.

"Dissolve the ferrous sulphate in 30 fl.ounces (or 600 Cc.) of the distilled water and the sodium phosphate in an equal quantity of distilled water; when each of the solutions has cooled to between 100° and 130°F . (37.8° and 54.5°C .), add the latter to the former, pouring in also a solution of the sodium bicarbonate in a little distilled water; mix thoroughly; transfer the precipitate to a calico filter; wash it with hot distilled water until the washings no longer afford any reactions with the tests for sulphates; finally dry the precipitate at a temperature not exceeding 120°F . (48.9°C .)." < Br.

Characteristics. This is a slate-blue amorphous powder, insoluble in water, soluble in hydrochloric and some other acids. It is the phosphate of iron which has long been official in the pharmacopœias. In the U. S. P., 1880, a scale salt, soluble in water was introduced under the same name and confusion is liable to occur in working formulas in which this is directed, as it bears the same name as the insoluble preparation. In the 1890 U. S. P. the name of the scale or flake salt was changed to *Ferri Phosphas Solubilis*, which see. Dose, 5 to 10 grains.

FERRI PHOSPHAS SOLUBILIS. U. S.**Soluble Ferric Phosphate.**

"It should contain Ferric Phosphate corresponding in amount to not less than 12 percent. of metallic iron, and should be kept in amber-colored bottles, protected from light." < U. S.

No formula for the preparation of this salt is given in the present revision, but the following was given in the 7th revision:

Ferric citrate, 50 Gm. (or 5 ounces); sodium phosphate, uneffloresced, 55 Gm. (or 5.5 ounces); distilled water, 100 Cc. (or 10 ounces). The ferric citrate is to be dissolved in the distilled water, by heating on a water-bath; the sodium phosphate is to be added to the solution and stirred constantly until it is dissolved. The solution is then to be evaporated on a water-bath, at a temperature not exceeding 60°C . (140°F .) to the consistence of a thick syrup, and spread upon glass plates so that when dry the salt may be obtained in scales. < U. S.

The change of the name of this preparation will be noted. It was introduced in the sixth revision under the title *Ferri Phosphas—Phosphate of Iron*. The change in the seventh was probably made

to distinguish it from the former official slate-blue powder known as Phosphate of Iron (Ferrous Phosphate). The proportion of sodium phosphate is slightly decreased in the present Pharm. This salt is freely soluble in water, but insoluble in alcohol. It is not, like pyrophosphate of iron, deposited or gelatinized in the presence of quite dilute acids.

Average dose, 0.250 Gm.=250 milligrammes (4 grains).

FERRI PYROPHOSPHAS SOLUBILIS. U. S.

Soluble Ferric Pyrophosphate.

"It should contain Ferric Pyrophosphate corresponding in amount to not not less than 10 percent. of metallic iron, and should be kept in amber-colored, well-stoppered bottles, protected from light." <U. S.

No formula for the preparation of this salt is given in the present revision, but the following was given in the 7th revision:

Ferric citrate, 50 Gm. (or 5 ounces); sodium pyrophosphate, un-effloresced, 50 Gm. (or 5 ounces); distilled water, 100 Cc. (or 10 ounces). The ferric citrate is to be dissolved in the distilled water by the heat of a water-bath. The sodium pyrophosphate is to be added to the solution and stirred until dissolved. The solution is then to be evaporated on a water-bath to the consistence of a thick syrup and spread upon glass plates to dry so that the salt may be obtained in scales. <U. S.

This preparation was formerly known as Ferri Pyrophosphas, but the title was changed in the 1890 revision. It was formerly much used in making elixirs and syrups, but since the introduction of soluble ferric phosphate, that has been generally used instead. Dose, 2 to 5 grains. Average dose, 0.250 Gm.=250 milligrammes (4 grains).

FERRI SULPHAS. U. S., Br. Ferrous Sulphate.

Iron Sulphate. Copperas. Green Vitriol.



"It should contain not less than 99.5 percent. of pure Ferrous Sulphate [$\text{SO}_2 \cdot \text{O}_2\text{Fe} + 7\text{H}_2\text{O}$]; the crystals should not be effloresced and should be kept in well-stoppered bottles." <U. S.

"Ferrous sulphate may be prepared by the interaction of diluted sulphuric acid and iron." <Br.

In its impure condition, this is commonly called "copperas." It is prepared on a large scale by manufacturing chemists from scrap iron and oil of vitriol, and purified for pharmaceutical uses. It may be made experimentally by dissolving 3 ounces av. of iron wire with 4 fl.ounces pure sulphuric acid mixed with two pints of water. When the disengagement of hydrogen gas has nearly ceased, boil for 10 minutes; then cool, filter the solution and set aside to crystallize.

After 24 hours collect the crystals, drain on porous bricks, and when dry preserve in stoppered bottles.

Uses. Iron sulphate is the basis of many of the other salts of iron, which are made by decomposing it. It is quite astringent, both externally and internally. The commercial sulphate of iron (copperas) is considerably used as a disinfectant and as a wash for trees to prevent worms and bugs.

Average dose, 0.200 Gm.=200 milligrammes (3 grains).

FERRI SULPHAS EXSICCATUS. U. S. Br.

Exsiccated Ferrous Sulphate.

[Approximately, $2\text{FeSO}_4 + 3\text{H}_2\text{O}$. U. S.].

Ferrous sulphate in coarse powder, 100 Gm., or any convenient quantity. The salt is kept for some time at about 40°C . (104°F .) in the air, allowing it to effloresce, and then heated in a porcelain dish on a water-bath, constantly stirring until the product weighs from 64 to 65 Gm. or has slightly less than two-thirds its original weight. This then is reduced to a fine powder and kept in well-stoppered bottles. <U. S. Average dose, 0.125 Gm.=125 milligrammes (2 grains).

The Br. P. directs Ferrous Sulphate to be exposed in a porcelain or iron dish to a temperature of 212°F . (100°C .), stirring occasionally until aqueous vapor ceases to be given off; the residue, which should be about 60 percent. of the original quantity taken, is then to be reduced to a fine powder. <Br. Dose, $\frac{1}{2}$ to 3 grains.

It will be observed that the heat directed in the U. S. P. is only about half that directed in the Br. P. This produces a powder having a greater percentage of moisture, as shown in the difference stated in the percentage of residue.

FERRI SULPHAS GRANULATUS. U. S.

Granulated Ferrous Sulphate.



Ferrous sulphate, 100 Gm. (or 10 ounces); distilled water, 100 Gm. (or 10 ounces); diluted sulphuric acid, 5 Cc. (or $\frac{1}{2}$ fl.ounce); alcohol, 25 Cc. (or $2\frac{1}{2}$ fl.ounces). The ferrous sulphate is to be dissolved in the distilled water, previously heated to boiling, and the sulphuric acid added. The solution is then to be filtered while hot and immediately evaporated in a tared (weighed) porcelain capsule, on a sand-bath to 150 Gm. (or 15 ounces). It is then to be quickly cooled, stirring constantly, and then transferred to a glass funnel, stopped with a plug of absorbent cotton and allowed to drain. When thoroughly drained the alcohol is to be poured upon it, and when drained again the crystalline powder is to be spread upon bibulous paper and quickly dried at ordinary temperature, transferred to dry bottles, and closely stopped. <U. S.

Uses. This is the same as iron sulphate, but purified, and is more convenient to use in making powders, pills etc. It is also much less liable to change than the crystalline salt.

Average dose.—0.200 Gm.=200 milligrammes (3 grains).

FERRUM. U. S., Br. Iron.

Fe=55.5.

"Metallic Iron in the form of fine, bright and non-elastic wire." <U. S.

"Annealed iron wire, having a diameter of about 0.005 inch (0.1 millimeter) (about No. 35 wire gauge), or wrought iron nails, free from oxide." <Br.

Iron and its various salts are more fully described under the heading Iron in the Chemical Section of this work, Part I.

FERRUM REDUCTUM. U. S. FERRUM REDACTUM. Br.

Reduced Iron.

"Reduced Iron should contain not less than 90 percent. of pure metallic iron." <U. S.

This is described in the Br. P. as "a fine powder, containing at least 75 percent. of metallic iron, with a variable amount of iron oxide; prepared by reducing ferric hydroxide, heated to a dull redness, by a stream of dry hydrogen."

Iron subcarbonate is first thoroughly washed with water until freed from all traces of sodium sulphate, then calcined until free from moisture, and placed in a reduction tube heated to dull redness, through which a current of purified hydrogen gas is made to pass for from 5 to 8 hours, or until the oxygen of the iron salt has completely combined with the hydrogen and escaped in the form of steam, leaving the reduced metallic iron in the form of a fine grayish powder.

Uses. Reduced iron, or Quevenne's Iron by Hydrogen, as it is frequently called, is used in pharmacy for making pills, lozenges etc., and may be used instead of iron wire for making fine preparations, but it is too expensive for general use.

Average dose.—0.065 Gm.=65 milligrammes (1 grain).

FERRUM TARTARATUM. Br. Tartarated Iron.

This scale salt of iron, which is official in the Br. P. under the above title is the same as the U. S. P. Ferri et Potassii Tartras, which see.

Dose. 5 to 10 grains.

Other Iron Compounds.

Besides the foregoing official salts of iron and those described in Part I. under the title Iron, are a considerable number of organic combinations that have recently come into use. The more important are as follows:

Iron Albuminate. A neutral preparation is made by taking dry egg albumen 480 grains, solution chloride of iron 100 grains. Dissolve the egg albumen in sufficient water, dilute the iron solution with the water. Mix the two solutions and add a saturated solution of common salt containing 2 tr.ounces of salt. A precipitate forms which must be well washed and dried. This is given for anæmia, chlorosis and debilitated conditions of the blood. Dose 3 to 6 grains.

Iron Albuminate Solution. Mix the moist magma that is precipitated and washed, as above, in cinnamon water $3\frac{1}{2}$ ounces, glycerin, by weight, 6 ounces. To this mixture add solution of potassa sufficient to make a clear and neutral solution.

Iron Glycerinophosphate. Prepare a glycerinophosphate as directed under that heading and mix it with freshly precipitated ferric hydroxide until the latter is slightly in excess. After standing pour off the clear liquid and precipitate it by pouring into alcohol. Collect the precipitate and dry it with gentle heat. Dose 2 to 5 grains.

Ferrotinol. A name applied by a European manufacturer to iron-tonol or iron glycerinophosphate.

Iron Peptonate or Peptonized Iron. This may be prepared by mixing peptone, in scales, with soluble iron phosphate, in scales, equal parts, and rubbing them together to a fine powder; or it may be produced in scales by dissolving soluble iron phosphate in a solution of peptone and evaporating the solution to a thick liquid which is to be spread upon plates of glass to dry.

Iron Succinate may be prepared by dissolving freshly precipitated ferric hydrate in succinic acid to saturation and evaporating to a brown powder. This is employed as a solvent for biliary calculi. Dose 60 grains after meals.

Fareol. A preparation containing 7 percent. of iron, probably combined with albumen. It is soluble only in water which is slightly alkaline. It is used in anæmic conditions accompanied by gastric troubles and headache. Specially recommended in chlorosis.

Ferratin. (Also called Ferralbumin). A tasteless powder composed of albuminous elements of meat with 6 percent. of iron. A ferruginous food, tonic and reconstructive. Dose 5 to 15 grains.

Ferratose. Liquor Ferratini. A solution of ferratin containing 3 percent. or iron. Dose 3 or 4 tablespoonfuls daily.

Ferrichtol. A compound of iron and ichthyol, iron sulphoichthyolate. A brownish-black tasteless powder, quite insoluble in usual solvents, containing $2\frac{1}{2}$ percent. of iron. It is used as an iron tonic in anæmia and chlorosis. Dose 5 to 20 grains.

Ferrinol. A nucleide of iron containing about $4\frac{1}{2}$ percent. each of iron and phosphorus. It is a brown powder soluble in hot water. Dose as a tonic and nutritive 3 to 5 grains on empty stomach.

Ferripyrine or **Ferropyrine**. A compound of ferric chloride with antipyrine. An orange-colored powder containing 64 percent. antipyrine, 36 percent. iron chloride. Styptic, antineuralgic in anæmia, chlorosis, migraine, hemorrhages etc. Dose 5 to 15 grains. Applied as a styptic in 20 percent. solution and as an astringent in 1 to 2 percent. solution. See also Antipyrine Ferrated. Page 434.

Ferromangan. A solution of iron peptonate with manganese, containing 0.6 percent. of iron, 0.1 percent. of manganese and 1.5 percent. of peptone. Dose 1 to 4 fl.drachms.

Ferro-Somatose. A brown, odorless, tasteless powder, used as a nutritive and tonic. It is readily soluble in water and is quite similar in action to iron albuminate and ferratin. It contains 2 percent. of iron organically combined. Dose 30 to 60 grains.

Many other compounds of iron having similar names and properties are found in various forms on the market.

FLUIDEXTRACTA — FLUIDEXTRACTS.

The important change made in the Latin titles of Fluid Extracts, in the 8th revision of the U. S. P. admits of their classification together instead of with Extracts as had heretofore been the custom.

Fluidextracts aim to represent the entire soluble medicinal constituents of a certain weight of drug in an equivalent fluid measure. As such they are the most convenient of the galenicals, for they may be used in place of the drugs themselves in making many preparations extemporaneously that would otherwise require considerable time to prepare. They are also very convenient to prescribe, as the dose is the same as of the powdered drug or substance from which they are prepared.

Since the introduction of fluidextracts, about A. D. 1840, many methods for making them have been proposed, all having the same object, viz.: To represent the entire medicinal value of a specified weight of the drug in an equivalent quantity of fluidextract. While in the main, this may readily be done, yet it must be borne in mind that the entire medicinal value of some drugs cannot be held in solution in an equivalent fluid measure of fluidextract, by the menstrua usually employed for making them.

A brief description of the principal methods which have heretofore been employed for making fluidextracts, is given for the convenience of our readers, but the process of water-bath percolation presents great advantages over any other, and should therefore be employed in making these preparations. It is, in fact, the only process by which first-class fluidextracts can be made economically, in a small way, by druggists.

The value of a fluidextract depends upon the amount of active medicinal agent that it contains, and the formulæ given are designed

to best secure that end, without producing preparations loaded with inert and worthless extractive matter as is often the case with those furnished by manufacturers.

The formulas are each calculated to make 1000 grammes of fluid-extract in accordance with the U. S. P., but larger quantities may be made somewhat more advantageously.

In making larger quantities it may be unnecessary to continue the heat so long as is directed, as the water-bath will retain its heat for some time when once heated.

When fluidextracts are used for making tinctures, infusions, syrups etc., fluid measure equivalent to the weight of the drug, or drugs directed may be used. Solid extracts may be made from nearly all the fluidextracts by evaporating them to the proper pilular consistence.

The following are the principal popular methods which may be employed for making fluidextracts:

U. S. P. Process.

No general formula is given in the U. S. Pharmacopœia for making fluidextracts, each drug having a detailed formula for itself; but from them the following general formula may be deduced:

1000 grammes of the powdered material directed to be used are moistened with from 300 to 500 cubic-centimeters of menstruum (according to the nature of the drug) and properly packed in a suitable percolator; enough menstruum is then added to saturate the powder, and leave a stratum above it. When the liquid begins to drop from the percolator, the lower orifice is closed, the percolator covered, and the drug is allowed to macerate twenty-four to forty-eight hours. The stopper is then loosened, and the percolation allowed to proceed gradually, adding first the remainder of 1000 grammes of the menstruum, then more menstruum as is directed, until the drug is exhausted. The first 700 to 900 Cc. of the percolate are reserved and the remainder evaporated to a soft extract; this soft extract is then to be dissolved in the reserved portion and enough menstruum (as is directed in the formula) added to make the fluidextract measure 1000 Cc.

Fluidextracts made by this process represent the medicinal value of a gramme of a drug in a cubic-centimeter, therefore the weight of the drug and fluid measure of the fluidextract are equivalent.

Repercolation Process.

The following is an abstract of Squibb's method of fractional or repercolation. The process is probably the best cold process in use, but it is too tedious to be generally employed by druggists; some skill and experience are required to use it successfully:

To make 3 pints of a fluidextract take of

The required drug or drugs, in powder as directed, 50 ounces av.

The required menstruum, as directed, a sufficient quantity.

First.—Take $\frac{1}{3}$ of the powder ($16\frac{2}{3}$ ounces av.) and three pints of the menstruum required. Moisten the powder with from 6 to 8 fl. ounces of the menstruum, pack it properly in a suitable percolator, pour upon it sufficient menstruum to saturate the drug and leave a stratum above it, and when the percolate begins to drop, close the lower orifice and allow to macerate from two to three days; then begin to percolate, adding the remainder of the menstruum (and more if necessary) to the powder, continuing the percolation until the drug is exhausted, reserving the percolate as it passes in the following manner:

Reserve the first 12 fl.ounces,	mark a
the next 6 fl.ounces,	mark b
the next 8 fl.ounces,	mark c
the remainder of the percolate,	mark d

The last portion, d, is a variable quantity, but should be from 16 to 30 fl.ounces. With some drugs this may be forced through by adding water through the percolator, while with others the same menstruum must be used throughout.

Second.—Take $\frac{1}{3}$ more of the powder ($16\frac{2}{3}$ ounces av.) as before, moisten it with the portion of the percolate marked b, pack as before, pour upon it the percolate marked c, and afterwards sufficient of the percolate marked d and sufficient fresh menstruum to exhaust the drug, reserving the percolate as follows:

Reserve the first 16 fl.ounces,	mark e
the next 6 fl.ounces,	mark f
the next 8 fl.ounces,	mark g
the remainder of the percolate,	mark h

The last portion, h, is a variable quantity, but should be from 16 to 20 fl.ounces. With some drugs it may be forced out with water, while with others the same menstruum should be used throughout.

Third.—Take the remaining $\frac{1}{3}$ ($16\frac{2}{3}$ ounces av.) of the powder, moisten it with the portion marked f, pack as before, pour upon it the portion marked g, and afterwards sufficient of the percolate marked h to saturate the powder and leave a stratum above; allow to macerate and percolate as before, adding the remainder of the percolate marked h, and sufficient fresh menstruum to exhaust the drug, receiving the percolate as follows:

Reserve the first 20 fl.ounces,	mark i
the remainder of the percolate,	mark j

Lastly.—Mix the reserved portions, a, e and i, which constitute the fluidextract, and reserve the last portion j, to moisten and percolate the next batch of the drug of the same kind to be made into fluidextract, marking it “repercolate” of the drug or drugs from which the fluidextract was prepared.

Pressure Process.

The following is an abstract of N. Spencer Thomas' method of extracting the strength of drugs by maceration and pressure:

Although this process does not entirely exhaust the medicinal strength of drugs, it produces better extracts than many that are on the market, and it is particularly suited to bulky drugs and those which soften when moistened with the menstruum.

First.—Take $16\frac{2}{3}$ ounces av. of the drug of the proper fineness, and menstruum sufficient. Moisten the drug with from 8 to 12 fl.ounces of the menstruum (according to the nature of the drug), and set aside in a wide-mouthed jar, or suitable vessel. Allow to stand four days, then press out as much as possible with a tincture press, and reserve the product.

Second.—Break up and moisten the same drug as before, with from 6 to 8 ounces of the menstruum. Allow to stand, and press out as before, adding the product to the portion before reserved.

Third.—Repeat the second operation, adding the product to the portions before reserved.

Fourth.—Repeat the second operation, but so regulate the last amount of menstruum added to make 1 pint of the fluid extract when added to the portions before reserved. Filter, if necessary.

When this process is employed, the drugs should be enclosed in a coarse canvas cloth or bag before putting in the press. The pressure should be gradual and long continued, that the moisture may be, as nearly as possible, extracted from the drugs. A 1-gallon tincture press will answer very well for making from 1 to 3 pounds of fluid-extract.

Combination Process — Repercolation and Pressure.

A combination of the repercolation and pressure process is used by some manufacturers. The percolation is conducted the same as is directed for repercolation, except that the last portions, d, h and j, are obtained by pressure instead of by percolation. It is more economical than repercolation alone, as there is no loss of menstruum in the last part of the percolations, which is quite an important item of the expense of the fluidextract. Many manufacturers prepare their fluid-extracts in this manner.

Water-Bath Percolation Process.

1000 grammes of the powdered drug or drugs directed to be used are moistened with from 300 to 500 Cc. of the menstruum required, and, after standing a few hours, properly packed in a suitable water-bath percolator. Enough of the menstruum is then poured on to saturate the drug and leave a stratum above it. When the liquid begins to drop the lower orifice is closed by means of the stop-cock, the percolator covered and the contents allowed to macerate from 24 to 48 hours. Water is then poured into the water-bath surrounding the per-

colator to about one-half the height of the apparatus and heat applied, moderately, for from 1 to 2 hours. Percolation is then begun and continued gradually, adding fresh menstruum from time to time through the percolator, until the drug is exhausted. The first 750 to 900 Cc. of the percolate (according to the nature of the drug) is reserved, and the remainder evaporated to a soft extract which is to be dissolved in the reserved percolate and enough menstruum added, if required, to make the fluidextract measure 1000 Cc.

GENERAL FORMULA FOR FLUIDEXTRACTS.

To save needless repetition of the directions for making fluidextracts similar to each other, the following classification has been adopted, and will be referred to by letter in the formulas. These directions conform to the U. S. P. using 1000 Gm. of the drug to make 1000 Cc. of the fluidextract.

General Formula A.

Fluidextracts prepared with alcohol as the menstruum.

Moisten the powder with from 200 to 350 Cc. (according to the nature of the drug) of alcohol, and pack firmly in the percolator; then add enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 24 to 48 hours. Then allow the percolation to proceed slowly, gradually adding alcohol, until the drug is exhausted. Reserve the first 900 Cc. of the percolate, and evaporate the remainder, (or it may be distilled) to a soft extract; dissolve this in the reserved portion and add enough alcohol (if required) to make the fluidextract measure 1000 Cc.

General Formula B.

Fluidextracts prepared with alcohol 4 volumes and water 1 volume.

Mix 800 Cc. of alcohol with 200 Cc. of water as a menstruum, and, having moistened the powder with from 300 to 400 Cc. of the mixture, pack it firmly in a percolator; then add enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for from 24 to 48 hours. Then allow the percolation to proceed slowly, gradually adding menstruum, until the drug is exhausted. Reserve the first 900 Cc. of the percolate, and evaporate the remainder to a soft extract; dissolve this in the reserved portion, and add enough menstruum to make the fluidextract measure 1000 Cc.

General Formula C.

Fluidextracts prepared with alcohol 3 volumes and water 1 volume.

Mix 750 Cc. of alcohol with 250 Cc. of water as a menstruum, and, having moistened the powder with from 300 to 400 Cc. of the mixture,

pack it firmly in a percolator; then add enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for from 24 to 48 hours. Then allow the percolation to proceed slowly, gradually adding menstruum until the drug is exhausted. Reserve the first 800 to 900 Cc. of the percolate, and evaporate the remainder to a soft extract; dissolve this in the reserved portion and add (if necessary) enough menstruum to make the fluidextract measure 1000 Cc.

General Formula D.

Fluidextracts prepared with alcohol $6\frac{1}{2}$ volumes and water $3\frac{1}{2}$ volumes.

Mix 650 Cc. of alcohol with 350 Cc. of water as a menstruum, and, having moistened the powder with from 300 to 400 Cc. of the mixture, pack it firmly in a percolator; then add enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for from 24 to 48 hours. Then allow the percolation to proceed slowly, gradually adding menstruum until the drug is exhausted. Reserve the first 800 to 850 Cc. of the percolate, and evaporate the remainder to a soft extract; dissolve this in the reserved portion and add enough menstruum to make the fluidextract measure 1000 Cc.

General Formula E.

Fluidextracts prepared with alcohol 2 volumes and water 1 volume.

Mix 600 Cc. of alcohol with 300 Cc. of water as a menstruum, and, having moistened the powder with from 300 to 400 Cc. of the mixture, pack it firmly in a percolator; then add enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for from 24 to 48 hours. Then allow the percolation to proceed slowly, gradually adding menstruum until the drug is exhausted. Reserve the first 800 to 850 Cc. of the percolate, and evaporate the remainder to a soft extract; dissolve this in the reserved portion and add enough menstruum to make the fluidextract measure 1000 Cc.

General Formula F.

Fluidextracts prepared with diluted alcohol as the menstruum.

Moisten the powder with 400 Cc. (generally) of diluted alcohol and pack it firmly in a percolator; then add enough diluted alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 48 hours (generally). Then allow the percolation to proceed slowly, gradually adding

diluted alcohol until the drug is exhausted. Reserve the first 800 to 850 Cc. of the percolate and evaporate the remainder to a soft extract; dissolve this in the reserved portion and add enough diluted alcohol to make the fluidextract measure 1000 Cc.

General Formula G.

Fluidextracts prepared with alcohol 2 volumes and water 3 volumes.

Mix 400 Cc. of alcohol with 600 Cc. of water as a menstruum, and, having moistened the powder with 400 Cc. of the mixture, pack it firmly in a percolator; then add enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 48 hours. Then allow the percolation to proceed slowly, gradually adding menstruum until the drug is exhausted. Reserve the first 750 to 800 Cc. of the percolate and evaporate the remainder to a soft extract; dissolve this in the reserved portion and add enough menstruum to make the fluidextract measure 1000 Cc.

General Formula H.

Fluidextracts prepared with alcohol 1 volume and water 2 volumes.

Mix alcohol 300 Cc. with water 600 Cc. as a menstruum, and, having moistened the powder with 400 Cc. of the mixture, pack it firmly in a percolator; then add enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 48 hours. Then allow the percolation to proceed slowly, gradually adding menstruum until the drug is exhausted. Reserve the first 750 to 800 Cc. of the percolate and evaporate the remainder to a soft extract; dissolve this in the reserved portion and add enough menstruum to make the fluidextract measure 1000 Cc.

FLUIDEXTRACTUM ACONITI. U. S. Fluidextract of Aconite.

Aconite, in No. 60 powder,	1000 Gm.
Alcohol,	

Water, each, a sufficient quantity to make	1000 Cc.
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Prepare a fluidextract with a menstruum of alcohol 3 volumes and water 1 volume, according to the General Formula, C.

An assay process is given for this fluidextract which corresponds to the assay process for aconite root and requires that each 100 Cc. of the finished fluidextract shall contain 0.4 Gm. of aconitine.

Average dose.—0.05 Cc. (1 minim).

FLUIDEXTRACTUM APOCYNII. U. S.

Fluidextract of Apocynum.

Apocynum, in No. 60 powder,	1000 Gm.
Glycerin,	100 Gm.

Alcohol,

Water, each, a sufficient quantity to make	1000 Cc.
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The glycerin is to be mixed with 600 Cc. of alcohol and 300 Cc. of water and used as the first portion of the menstruum; the percolation is then to be continued with a menstruum of alcohol 6 volumes and water 4 volumes until the drug is exhausted. The first 900 Cc. of the percolate is reserved, and the remainder condensed by evaporation to 100 Cc. and added to the reserved portion, to make 1000 Cc. of the fluidextract.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM AROMATICUM. U. S.

Aromatic Powder, 1000 Gm.

Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with alcohol as the menstruum, according to the General Formula, A.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM AURANTII AMARI. U. S.

Fluidextract of Bitter Orange Peel.

Bitter Orange Peel, in No. 40 powder, 1000 Gm.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of alcohol $6\frac{1}{2}$ volumes and water $3\frac{1}{2}$ volumes, according to the General Formula, D.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM BELLADONNÆ RADICIS. U. S.

Fluidextract of Belladonna Root.

Belladonna Root, in No. 60 powder, 1000 Gm.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of 8 volumes of alcohol and 2 volumes of water, according to the General Formula, B.

An assay process is given for this fluidextract which corresponds to the assay process for belladonna root, and requires that each 100 Cc. of the finished fluidextract shall contain 0.5 Gm. of mydriatic alkaloids from belladonna root.

Average dose.—0.05 Cc. (1 minim).

Extractum Belladonnæ Liquidum. Br. Liquid Extract of Belladonna. This preparation corresponds to the Fluidextract of Belladonna of the U. S. P., but represents 0.75 Gm. of the alkaloids of belladonna root in 100 Cc. and is, therefore, 50% stronger than the U. S. fluidextract.

FLUIDEXTRACTUM BERBERIDIS. U. S.

Fluidextract of Berberis.

Berberis, in No. 60 powder, 1000 Gm.

Diluted Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with diluted alcohol according to the General Formula, F.

Average dose.—2 Cc. (30 minims).

FLUIDEXTRACTUM BUCHU. U. S. Fluidextract of Buchu.

Buchu, in No. 60 powder, 1000 Gm.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of alcohol 3 volumes and water 1 volume, according to the General Formula, C.

Average dose.—2 Cc. (30 minims).

FLUIDEXTRACTUM CALAMI. U. S. Fluidextract of Calamus.

[Sweet Flag].

Calamus, in No. 40 powder, 1000 Gm.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of alcohol 3 volumes and water 1 volume, according to the General Formula, C.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM CALUMBÆ. U. S.

Fluidextract of Calumba.

Calumba, in No. 20 powder, 1000 Gm.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of alcohol 3 volumes and water 1 volume, according to the General Formula, C.

Average dose.—2 Cc. (30 minims).

FLUIDEXTRACTUM CANNABIS INDICÆ. U. S.

Fluidextract of Indian Cannabis. [Indian Hemp].

Indian Cannabis, in No. 30 powder, 1000 Gm.

Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with alcohol as a menstruum, according to the General Formula, A.

Average dose.—0.05 Cc. (1 minim).

FLUIDEXTRACTUM CAPSICI. U. S. Fluidextract of Capsicum.

Capsicum, in No. 50 powder, 1000 Gm.

Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with alcohol as the menstruum, according to the General Formula, A.

Average dose.—0.05 Cc. (1 minim).

FLUIDEXTRACTUM CHIMAPHILÆ. U. S.**Fluidextract of Chimaphila. [Pipsissewa].**

Chimaphila, in No. 30 powder, 1000 Gm.

Diluted Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract, with diluted alcohol as the menstruum, according to the General Formula, F.

Average dose.—2 Cc. (30 minims).

FLUIDEXTRACTUM CHIRATÆ. U. S. Fluidextract of Chirata.

Chirata, in No. 30 powder, 1000 Gm.

Diluted Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract, with diluted alcohol as the menstruum, according to the General Formula, F.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM CIMICIFUGÆ. U. S.**Fluidextract of Cimicifuga. [Black Cohosh].**

Cimicifuga, in No. 60 powder, 1000 Gm.

Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract, with alcohol as the menstruum, according to the General Formula, A.

Average dose.—1 Cc. (15 minims).

Extractum Cimicifugæ Liquidum. Br. Liquid Extract of Cimicifuga.

This liquid extract corresponds with the Fluidextract of Cimicifuga of the U. S. P. and is made in a similar manner, the only difference being that 90 percent. alcohol is used as a menstruum. Dose, 5 to 30 minims.

FLUIDEXTRACTUM CINCHONÆ. U. S.**Fluidextract of Cinchona.**

Cinchona, in No. 60 powder, 1000 Gm.

Glycerin, 100 Cc.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

The glycerin is to be mixed with 800 Cc. of alcohol and 100 Cc. of water for the first menstruum; the percolation is then to be continued with a menstruum of 800 Cc. of alcohol and 200 Cc. of water, until the drug is exhausted. The first 750 Cc. of percolate is reserved and the remainder condensed by evaporation to a soft extract, which is to be dissolved in the reserved portion to make 1000 Cc. of the fluid-extract.

An assay process is given for this fluidextract which corresponds to the assay process for cinchona, and requires that each 100 Cc. of the

finished fluidextract shall contain 4 Gm. of anhydrous, ether-soluble alkaloids from cinchona.

Average dose.—1 Cc. (15 minims).

Extractum Cinchonæ Liquidum. Br. Liquid Extract of Cinchona. This preparation corresponds to the Fluidextract of Cinchona of the U. S. P., but represents 5 Gm. of the alkaloids of the bark in 100 Cc. and is, therefore, about 25% stronger than the U. S. fluidextract. Dose, 5 to 10 minims.

This liquid extract is prepared by percolating 20 ounces of red cinchona bark with 100 ounces of distilled water, mixed with 5 fl.drachms of hydrochloric acid and 2½ ounces of glycerin as the first menstruum, and then with water until exhausted; then evaporating the percolate to 20 fl.ounces, assaying, evaporating and adding alcohol and water to make the completed liquid extract contain 5 Gm. of alkaloids in 100 Cc., or 5 grains in 110 minims.

FLUIDEXTRACTUM COCÆ. U. S. Fluidextract of Coca.

Coca, in No. 40 powder, 1000 Gm.

Diluted Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract, with diluted alcohol as the menstruum, according to the General Formula, F.

An assay process is given for this fluidextract which corresponds to the assay process for Coca, and requires that each 100 Cc. of the finished fluidextract shall contain 0.5 Gm. of the ether-soluble alkaloids from coca.

Extractum Cocæ Liquidum. Br. Liquid Extract of Coca. This preparation corresponds to the Fluidextract of Coca of the U. S. P. except that it is made with 60% alcohol instead of diluted alcohol. Dose, ½ to 1 fl.drachm.

Average dose.—2 Cc. (30 minims).

FLUIDEXTRACTUM COLCHICI SEMINIS. U. S.

Fluidextract of Colchicum Seed.

Colchicum Seed, in No. 50 powder, 1000 Gm.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of alcohol 2 volumes and water 1 volume, according to the General Formula, E.

An assay process is given for this fluidextract which corresponds to the assay process for colchicum seed, and requires that each 100 Cc. of the finished fluidextract shall contain 0.5 Gm. of colchicine.

Average dose.—0.2 Cc. (3 minims).

FLUIDEXTRACTUM CONII. U. S. Fluidextract of Conium.

Conium, in No. 40 powder, 1000 Gm.

Acetic Acid, 20 Cc.

Diluted Alcohol, a sufficient quantity to make 1000 Cc.

The acetic acid is to be mixed with 980 Cc. of diluted alcohol, and used as the first portion of the menstruum; the percolation is then to be continued with diluted alcohol until the drug is exhausted. The first 850 Cc. of the percolate is to be reserved and the remainder evaporated at a temperature not exceeding 50°C. (122°F.), to a soft extract, which is mixed with the reserved portion to make 1000 Cc. of the fluidextract.

An assay process is given for this fluidextract which corresponds to the assay process for Conium, and requires that each 100 Cc. of the finished fluidextract shall contain 0.45 Gm. of coniine.

Average dose.—0.2 Cc. (3 minims).

FLUIDEXTRACTUM CONVALLARIÆ. U. S.

Fluidextract of Convallaria. [Lily of the Valley].

Convallaria, in No. 60 powder, 1000 Gm.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of alcohol $6\frac{1}{2}$ volumes and water $3\frac{1}{2}$ volumes, according to the General Formula, D.

Average dose.—0.5 Cc. (8 minims).

FLUIDEXTRACTUM CUBEÆ. U. S. Fluidextract of Cubeb.

Cubeb, in No. 40 powder, 1000 Gm.

Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with alcohol as the menstruum, according to the General Formula, A.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM CYPRIPIEDII. U. S.

Fluidextract of Cypripedium. [Ladies' Slipper].

Cypripedium, in No. 60 powder, 1000 Gm.

Diluted Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract, with diluted alcohol as the menstruum, according to the General Formula, F.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM DIGITALIS. U. S.

Fluidextract of Digitalis. [Foxglove].

Digitalis, in No. 60 powder, 1000 Gm.

Diluted Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract, with diluted alcohol as the menstruum, according to the General Formula, F.

Average dose.—0.05 Cc. (1 minim).

FLUIDEXTRACTUM ERGOTÆ. U. S. Fluidextract of Ergot.

Ergot, recently ground and in No. 60 powder, 1000 Gm.

Acetic Acid, 20 Cc.

Diluted Alcohol, a sufficient quantity to make 1000 Cc.

The acetic acid is to be mixed with 980 Cc. of diluted alcohol, and used as the first portion of the menstruum; the percolation is then to be continued with diluted alcohol until the drug is exhausted. The first 850 Cc. of the percolate is to be reserved and the remainder evaporated at a temperature not exceeding 50°C. (122°F.), to a soft extract, which is mixed with the reserved portion to make 1000 Cc. of the fluidextract.

Average dose.—2 Cc. (30 minims).

Extractum Ergotæ Liquidum. Br. **Liquid Extract of Ergot.** This preparation is the Br. representative corresponding to the U. S. P. Fluidextract of Ergot, but is made in a different manner. The formula is:

Ergot, crushed,	20	ounces av. or 400 Gm.
Distilled Water,	150	fl.ounces or 3000 Cc.
Alcohol, (90%),	7½	fl.ounces or 150 Cc.

“Digest the crushed ergot in 100 fl.ounces (or 2000 Cc.) of the distilled water for 12 hours; draw off the infusion; repeat the digestion with the remainder of the distilled water; press; strain; evaporate the liquid to 14 fl.ounces (or 280 Cc.); when cold add the alcohol and set aside for an hour; filter. The product should measure 20 fl.ounces (or 400 Cc.). Dose, 10 to 30 minims.” < Br.

It will be noted that, although this has the same drug percentage as the U. S. fluidextract, it does not contain acetic acid and has much less alcoholic strength.

FLUIDEXTRACTUM ERIODICTYI. U. S.

Fluidextract of Eriodictyon. [Yerba Santa].

Eriodictyon, in No. 60 powder,	1000	Gm.
Alcohol,		

Water, each, a sufficient quantity to make	1000	Cc.
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Prepare a fluidextract with a menstruum of alcohol 4 volumes and water 1 volume, according to the General Formula, B.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM EUCALYPTI. U. S.

Fluidextract of Eucalyptus.

Eucalyptus, in No. 40 powder,	1000	Gm.
Alcohol,		

Water, each, a sufficient quantity to make	1000	Cc.
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Prepare a fluidextract with a menstruum of alcohol 3 volumes and water 1 volume, according to the General Formula, C.

Average dose.—2 Cc. (30 minims).

FLUIDEXTRACTUM EUONYMI. U. S.

Fluidextract of Euonymus. [Wahoo].

Euonymus, in No. 40 powder,	1000	Gm.
Alcohol,		

Water, each, a sufficient quantity to make	1000	Cc.
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Prepare a fluidextract with a menstruum of alcohol 4 volumes and water 1 volume, according to the General Formula, B.

Average dose.—0.5 Cc. (8 minims).

FLUIDEXTRACTUM EUPATORII. U. S.

Fluidextract of Eupatorium. [Boneset].

Eupatorium, in No. 40 powder, 1000 Gm.

Diluted Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract, with diluted alcohol as the menstruum, according to the General Formula, F.

Average dose.—2 Cc. (30 minims).

EXTRACTUM FILICIS LIQUIDUM. Br.

Liquid Extract of Male Fern.

“Exhaust male fern rhizoma, in No. 20 powder, with ether, by percolation; evaporate the ether from the clear percolate on a water-bath or by distillation, until an oily extract remains. Dose, 45 to 90 minims.” < Br.

This liquid extract of the Br. P. corresponds to the Oleoresin of Aspidium of the U. S. P. which is known commercially as Extract of Male Fern, or Oil of Male Fern.

FLUIDEXTRACTUM FRANGULÆ. U. S.

Fluidextract of Frangula. [Buckthorn].

Frangula, in No. 40 powder, 1000 Gm.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Mix 5 volumes of alcohol with 8 volumes of water as a menstruum and prepare a fluidextract by percolation in the general manner directed, reserving the first 800 Cc. of the percolate and evaporating the remainder to a soft extract which is to be dissolved in the reserved portion and enough menstruum added, if required, to make the fluidextract measure 1000 Cc.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM GELSEMI. U. S.

Fluidextract of Gelsemium.

Gelsemium, in No. 60 powder, 1000 Gm.

Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with alcohol as the menstruum, according to the General Formula, A.

Average dose.—0.05 Cc. (1 minim).

FLUIDEXTRACTUM GENTIANÆ. U. S.

Fluidextract of Gentian.

Gentian, in No. 30 powder, 1000 Gm.

Diluted Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with diluted alcohol as the menstruum, according to the General Formula, F.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM GERANII. U. S. Fluidextract of Geranium.

Geranium, in No. 30 powder,	1000 Gm.
Glycerin,	100 Cc.
Alcohol,	
Water, each, a sufficient quantity to make	1000 Cc.

Prepare a fluidextract by mixing the glycerin with 600 Cc. of alcohol and 300 Cc. of water as the first menstruum, then continuing the percolation with alcohol 600 Cc. and water 400 Cc. until the drug is exhausted. Reserve the first 800 Cc. of the percolate; evaporate the remainder to a soft extract; dissolve this soft extract in the reserved portion to make the finished fluidextract measure 1000 Cc.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM GLYCYRRHIZÆ. U. S.

Fluidextract of Glycyrrhiza. [Licorice].

Glycyrrhiza, in No. 20 powder,	1000 Gm.
Glycerin,	250 Cc.
Ammonia Water,	50 Cc.
Alcohol,	

Water, each, a sufficient quantity to make 1000 Cc.

"Pour 400 Cc. of boiling water upon the glycyrrhiza, contained in a suitable vessel, and allow it to stand for one hour. Pack the moistened powder loosely in a metallic percolator, pour boiling water upon it, and allow the percolation to proceed, supplying boiling water until the glycyrrhiza is exhausted. Evaporate the percolate at a moderate heat, until it measures 450 Cc., and, when cool, add 450 Cc. of alcohol. Mix well and set aside for three days. After filtering the liquid, distil it until 500 Cc. of distillate have been obtained; transfer the liquid in the still to a suitable container, add the glycerin, ammonia water and 200 Cc. of alcohol. Finally add sufficient water to make the fluidextract measure 1000 Cc." <U. S.

Average dose.—2 Cc. (30 minims).

Extractum Glycyrrhizæ Liquidum. Br. Liquid Extract of Liquorice. Liquorice root, in No. 20 powder, 20 ounces (or 1000 Gm.); distilled water, 100 ounces (or 5 litres), alcohol (90%), a sufficient quantity. "Mix the liquorice root with half of the distilled water; set aside for 24 hours; strain, press; to the pressed marc add the remainder of the distilled water and set aside for six hours; strain; press; mix the strained liquids; heat to 212°F. (100°C.); strain through flannel; evaporate until the fluid has acquired, when cold, a specific gravity of 1.200. Add to this one-fourth its volume of the alcohol; let the mixture stand for 12 hours; filter. Dose, ½ to 1 fl.drachm." <Br.

FLUIDEXTRACTUM GRANATI. U. S.**Fluidextract of Pomegranate.**

Pomegranate, in No. 30 powder,	1000 Gm.
Glycerin,	100 Cc.
Diluted Alcohol, a sufficient quantity to make	1000 Cc.

Prepare a fluidextract with a menstruum first of 900 Cc. of diluted alcohol mixed with glycerin, continue the percolation with diluted alcohol until the drug is exhausted. Reserve the first 850 Cc. of the percolate; evaporate the remainder to a soft extract and add it to the reserved portion to make the product measure 1000 Cc.

Average dose.—2 Cc. (30 minims).

FLUIDEXTRACTUM GRINDELIAE. U. S.**Fluidextract of Grindelia.**

Grindelia, in No. 30 powder,	1000 Gm.
Alcohol,	
Water, each, a sufficient quantity to make	1000 Cc.

Prepare a fluidextract with alcohol 3 volumes and water 1 volume, as a menstruum, according to the General Formula, C.

Average dose.—2 Cc. (30 minims).

FLUIDEXTRACTUM GUARANA. U. S. Fluidextract of Guarana.

Guarana, in No. 60 powder,	1000 Gm.
Diluted Alcohol, a sufficient quantity to make	1000 Cc.

Prepare a fluidextract with diluted alcohol as a menstruum, according to the General Formula, F.

An assay process for this fluidextract is given in the U. S. P. which is the same as is employed for assaying the drug, and requires that each 100 Cc. of the finished fluidextract shall contain 3.5 Gm. of the alkaloids from Guarana.

Average dose.—2 Cc. (30 minims).

FLUIDEXTRACTUM HAMAMELIDIS FOLIORUM. U. S.**Fluidextract of Hamamelis Leaves. [Witchhazel].**

Hamamelis Leaves, in No. 40 powder,	1000 Gm.
Glycerin,	100 Cc.
Alcohol,	

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum first of the glycerin, with alcohol 300 Cc. and water 600 Cc., and continue the percolation with a menstruum of 1 volume of alcohol and 2 volumes of water until the drug is exhausted. Reserve the first 850 Cc. of the percolate and evaporate the remainder to a soft extract, which dissolve in the reserved portion to make the fluidextract measure 1000 Cc.

Average dose.—2 Cc. (30 minims).

Extractum Hamamelidis Liquidum. Br. Liquid Extract of Hamamelis.

Hamamelis Leaves, in No. 40 powder, 20 ounces or 1000 Gm.

Alcohol, (45%), a sufficient quantity.

Prepare the same as a fluidextract, reserving the first 17 fl.ounces (or 850 Cc.); distil the alcohol from the remainder, evaporate the residue to a soft extract; dissolve this in the reserved portion to make the measure 20 fl.ounces (or 1000 Cc.) of the liquid extract.

Dose, 5 to 15 minims.

FLUIDEXTRACTUM HYDRASTIS. U. S.**Fluidextract of Hydrastis.**

Hydrastis, in No. 60 powder, 1000 Gm.

Glycerin, 100 Cc.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum first of the glycerin with alcohol 600 Cc. and water 300 Cc., and continue the percolation with a menstruum of alcohol 2 volumes with water 1 volume, until the drug is exhausted. Reserve the first 750 Cc. of the percolate, evaporate the remainder to a soft extract, dissolve this in the reserved portion to make the measure 1000 Cc.

An assay process is given in the U. S. P. for this fluidextract, conforming with the assay process given for Hydrastis, and requiring that each 100 Cc. of the finished fluidextract shall contain 2 Gm. of hydrastine.

Average dose.—2 Cc. (30 minims).

Extractum Hydrastis Liquidum. Br. Liquid Extract of Hydrastis.

Hydrastis Rhizome, in No. 60 powder, 20 ounces or 1000 Gm.

Alcohol, (45%), a sufficient quantity.

Prepare a liquid extract by percolating the drug with the menstruum. Reserve the first 17 fl.ounces (or 850 Cc.) of the percolate, distil the alcohol from the remainder, evaporate the residue to a soft extract and add to the reserved portion to make 100 Cc. of the finished liquid extract. Dose, 5 to 15 minims.

FLUIDEXTRACTUM HYOSCYAMI. U. S.**Fluidextract of Hyoscyamus.**

Hyoscyamus, in No. 60 powder, 1000 Gm.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of alcohol 2 volumes and water 1 volume, according to the General Formula, E.

An assay process is given in the U. S. P. for this fluidextract, conforming with the assay process given for Hyoscyamus, and requiring that each 100 Cc. of the finished fluidextract shall contain 0.075 Gm. of the alkaloids from hyoscyamus.

Average dose.—0.2 Cc. (3 minims).

FLUIDEXTRACTUM IPECACUANHÆ. U. S.**Fluidextract of Ipecac.**

Ipecac, in No. 80 powder, 1000 Gm.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of alcohol 3 volumes and water 1 volume, according to the General Formula, C.

An assay process is given in the U. S. P. for this fluidextract, conforming to the assay process given for Ipecac, and requiring that each 100 Cc. of the finished fluidextract shall contain 1.75 Gm. of the alkaloids from ipecac.

Average dose.—Emetic, 1 Cc. (15 minims). Expectorant, 0.05 Cc. (1 minim).

Extractum Ipecacuanhæ Liquidum. Br.**Liquid Extract of Ipecacuanha.**

"A liquid extract containing 2 to $2\frac{1}{4}$ grains of the alkaloids of Ipecacuanha Root in 110 minims (2 to 2.25 Gm. in 100 Cc.)"

This liquid extract is prepared by percolating ipecacuanha root 1 pound (or 800 Gm.), with 90 percent. alcohol until $13\frac{1}{2}$ fl.ounces (or 675 Cc.) have been collected. This is reserved. The percolation is continued until nothing more is extracted. Then 700 grains (or 80 Gm.) of calcium hydroxide are mixed with the marc and allowed to remain in contact for 24 hours; the percolation is then continued until the drug is completely exhausted. The alcohol is recovered from the last two percolations by distillation; and the residual extract dissolved in the portion first reserved. The liquid extract is then assayed and so prepared that it shall not contain less than 2 nor more than 2.25 grammes of alkaloids in 100 Cc. (or from 2 to $2\frac{1}{4}$ grains in 110 minims. Dose, expectorant $\frac{1}{2}$ to 2 minims, emetic 15 to 20 minims.

FLUIDEXTRACTUM KRAMERIÆ. U. S.**Fluidextract of Krameria. [Rhatany].**

Krameria, in No. 40 powder, 1000 Gm.

Diluted Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract, with diluted alcohol as the menstruum, according to the General Formula, F.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM LAPPÆ. U. S.**Fluidextract of Lappa. [Burdock].**

Lappa, in No. 60 powder, 1000 Gm.

Diluted Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract, with diluted alcohol as the menstruum, according to the General Formula, F.

Average dose.—2 Cc. (30 minims).

FLUIDEXTRACTUM LEPTANDRÆ. U. S.

Fluidextract of Leptandra. [Culver's Root].

Leptandra, in No. 60 powder, 100 Gm.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of alcohol 3 volumes and water 1 volume, according to the General Formula, C.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM LOBELIÆ. U. S. Fluidextract of Lobelia.

Lobelia, in No. 50 powder, 1000 Gm.

Acetic Acid,

Water, each, a sufficient quantity to make 1000 Cc.

"Mix 275 Cc. of acetic acid with 725 Cc. of water, and, having moistened the powder with 350 Cc. of the mixture, pack it firmly in a cylindrical glass percolator; then add enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 48 hours. Then allow the percolation to proceed slowly, gradually adding menstruum, using the same proportions of acetic acid and water as before, until the lobelia is exhausted. Reserve the first 900 Cc. of the percolate, and evaporate the remainder at a temperature not exceeding 50°C. (122°F.), to a soft extract; dissolve this in the reserved portion, and add enough menstruum to make the fluidextract measure 1000 Cc." < U. S.

Average dose.—0.5 Cc. (8 minims).

This formula is a type of the formulas for Fluid-acet-extracts, of which manufacturing chemists furnish a considerable number.

FLUIDEXTRACTUM LUPULINI. U. S. Fluidextract of Lupulin.

Lupulin, 1000 Gm.

Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract, with alcohol as the menstruum, according to the General Formula, A.

Average dose.—0.5 Cc. (8 minims).

FLUIDEXTRACTUM MATICO. U. S. Fluidextract of Matico.

Matico, in No. 60 powder, 1000 Gm.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract, with a menstruum of alcohol 3 volumes and water 1 volume, according to the General Formula, C.

Average dose.—4 Cc. (1 fl.drachm).

FLUIDEXTRACTUM MEZEREI. U. S.**Fluidextract of Mezereum.**

Mezereum, in No. 20 powder, 1000 Gm.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract, with a menstruum of alcohol 4 volumes with water 1 volume, according to the General Formula, B.

Dose, 5 to 15 minims, well-diluted. Dose not given in U. S. P. as it is rarely used internally except in combinations.

FLUIDEXTRACTUM NUCIS VOMICÆ. U. S.**Fluidextract of Nux Vomica.**

Nux Vomica, in No. 40 powder, 1000 Gm.

Acetic Acid, 50 Cc.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum first of the acetic acid, alcohol 750 Cc. and water 250 Cc., and continue the percolation with alcohol 3 volumes and water 1 volume, as a menstruum, until the drug is practically exhausted. Reserve the first 900 Cc. of the percolate, distil the alcohol from the remainder, and evaporate the residue at a temperature not exceeding 50°C. (122°F.), to a soft extract; dissolve this in the reserved portion and mix thoroughly, making a finished fluidextract of 1000 Cc.

An assay process is given in the U. S. P. conforming to the assay process of Nux Vomica, and requiring that 100 Cc. of the finished fluidextract shall contain 1 Gm. of strychnine.

Average dose.—0.05 Cc. (1 minim).

Extractum Nucis Vomicæ Liquidum. Br. Liquid Extract of Nux Vomica. "A liquid extract containing 1½ grains of strychnine in 110 minims (1.5 grammes in 100 cubic centimeters)." < Br.

A fluidextract is prepared with alcohol (70%), for the chief menstruum; but adding to the soft extract obtained by evaporation a little alcohol to ensure its solution. The liquid extract is then assayed and the quantity so regulated that 100 Cc. shall contain 1.5 Gm., or 110 minims shall contain 1½ grains of strychnine.

Dose, 1 to 3 minims.

It will be noted that the Br. liquid extract contains 50 percent. more of strychnine than the U. S. fluidextract.

EXTRACTUM OPII LIQUIDUM. Br. Liquid Extract of Opium.

There is no preparation corresponding to this in the U. S. P.

"A Liquid Extract containing ¾ grain of morphine in 110 minims (0.75 Gm. in 100 Cc.)" < Br.

Extract of Opium,	¾ ounce or 18.75 Gm.
Distilled Water,	16 fl.ounces or 400 Cc.
Alcohol, (90%),	4 fl.ounces or 100 Cc.

"Mix the extract of opium with the distilled water; set aside for an hour, stirring frequently; add the alcohol; set aside in a cool place for 24 hours; filter. The product should measure 20 fl.ounces (or 500 Cc.). Sp. gr. 0.985 to 0.995." < Br.

By assay this extract should yield an amount of morphine reckoned as anhydrous, corresponding to not less than 0.7 Gm., nor more than 0.8 Gm. in 100 Cc.

FLUIDEXTRACTUM PAREIRÆ. U. S. Fluidextract of Pareira.

Pareira, in No. 40 powder,	1000 Gm.
Glycerin,	100 Cc.
Alcohol,	
Water, each, a sufficient quantity to make	1000 Cc.

Prepare a fluidextract with a menstruum first of the glycerin with alcohol 600 Cc. and water 300 Cc.; continuing the percolation with a menstruum of 3 volumes of alcohol and 2 volumes of water, until the drug is exhausted. Reserve the first 850 Cc. of percolate, evaporate the remainder to a soft extract and add to the reserved portion to make the finished fluidextract measure 1000 Cc.

Average dose.—2 Cc. (30 minims).

Extractum Pareira Liquidum. Br. Liquid Extract of Pareira. This liquid extract of Pareira is prepared by percolating the drug with boiling water with maceration, until the drug is exhausted, then concentrating the percolate by evaporation and adding to this residual liquid enough 90% alcohol to produce a liquid extract equivalent to the weight of the drug taken. Filter or otherwise clarify, if necessary. Dose, ½ to 2 fl.drachms.

FLUIDEXTRACTUM PHYTOLACCÆ. U. S.

Fluidextract of Phytolacca. [Pokeroot].

Phytolacca, in No. 40 powder,	1000 Gm.
Diluted Alcohol, a sufficient quantity to make	1000 Cc.

Prepare a fluidextract, with diluted alcohol as the menstruum, according to the General Formula, F.

Average dose.—Emetic, 1 Cc. (15 minims); Alterative, 0.1 Cc. (1½ minims).

FLUIDEXTRACTUM PILOCARPI. U. S.

Fluidextract of Pilocarpus. [Jaborandi].

Pilocarpus, in No. 40 powder,	1000 Gm.
Diluted Alcohol, a sufficient quantity to make	1000 Cc.

Prepare a fluidextract, with diluted alcohol as the menstruum, according to the General Formula, F.

An assay process is given in the U. S. P. for this fluidextract, corresponding to the assay process for pilocarpus given in the U. S. P., and requiring that each 100 Cc. of the finished fluidextract shall contain 0.4 Gm. of the alkaloids from pilocarpus.

Average dose.—2 Cc. (30 minims).

Extractum Jaborandi Liquidum. Br. **Liquid Extract of Jaborandi.** This liquid extract, corresponding to the U. S. fluidextract of pilocarpus, is prepared with alcohol (45%), as a menstruum, and does not differ materially from the U. S. fluidextract. Dose, 5 to 15 minims.

FLUIDEXTRACTUM PODOPHYLLI. U. S.

Fluidextract of Podophyllum. [Mandrake].

Podophyllum, in No. 40 powder, 1000 Gm.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of alcohol 4 volumes and water 1 volume, according to the General Formula, B.

Average dose.—0.5 Cc. (8 minims).

FLUIDEXTRACTUM PRUNI VIRGINIANÆ. U. S.

Fluidextract of Wild Cherry.

Wild Cherry, in No. 30 powder, 1000 Gm.

Glycerin,

200 Cc.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Mix the glycerin with alcohol 200 Cc. and water 600 Cc. as the first menstruum. Macerate for 48 hours, then begin the percolation and continue it very slowly with a menstruum of alcohol 1 volume and water 4 volumes, until 1000 Cc. of the fluidextract is obtained.

Average dose.—2 Cc. (30 minims).

It will be observed that no evaporation is used in preparing this fluidextract, it being completed when 1000 Cc. of percolate has passed. This is because the medicinal value of this preparation depends upon the hydrocyanic acid which is developed during the maceration and percolation, and this, being volatile, would be dissipated if heat was used.

FLUIDEXTRACTUM QUASSIÆ. U. S. Fluidextract of Quassia.

Quassia, in No. 40 powder, 1000 Gm.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of alcohol 1 volume and water 2 volumes, according to the General Formula, H.

Average dose.—0.5 Cc. (8 minims).

FLUIDEXTRACTUM QUERCUS. U. S. Fluidextract of Quercus.
[White Oak].

Quercus, in No. 40 powder,	1000 Gm.
Glycerin,	100 Cc.
Diluted Alcohol, a sufficient quantity to make	1000 Cc.

Mix the glycerin with diluted alcohol 900 Cc. as the first menstruum, continuing the percolation with diluted alcohol until the drug is exhausted. Reserve the first 750 Cc. of the percolate and evaporate the remainder to a soft extract; dissolve this in the reserved portion to make the fluidextract measure 1000 Cc.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM QUILLAJÆ. U. S.
Fluidextract of Quillaja. [Soap Bark].

Quillaja, in No. 40 powder,	1000 Gm.
Diluted Alcohol, a sufficient quantity to make	1000 Cc.

Prepare a fluidextract with diluted alcohol as the menstruum, according to the General Formula, F.

Average dose.—0.2 Cc. (3 minims).

FLUIDEXTRACTUM RHAMNI PURSHIANÆ. U. S.
Fluidextract of Cascara Sagrada.

Cascara Sagrada, in No. 40 powder,	1000 Gm.
Alcohol,	
Water, each, a sufficient quantity to make	1000 Cc.

Prepare a fluidextract with a menstruum of alcohol 2 volumes and water 3 volumes, according to the General Formula, G.

Average dose.—1 Cc. (15 minims).

Extractum Cascaræ Sagradæ Liquidum. Br. Liquid Extract of Cascara Sagrada.

Cascara Sagrada, in No. 20 powder, 20 ounces	or 1000 Gm.
Alcohol, (90%),	4 fl.ounces or 200 Cc.
Distilled Water, a sufficient quantity.	

“Moisten the cascara sagrada with 15 fl.ounces (or 750 Cc.) of the distilled water, and set the mixture aside for 6 hours; then place it loosely in a percolator and percolate with more of the distilled water until the powder is exhausted; evaporate the percolate to 12 fl.ounces (or 600 Cc.); add the alcohol previously mixed with 4 fl.ounces (or 200 Cc.) of distilled water, or with sufficient to make up the volume of the mixed liquids to 20 fl.ounces (or 1000 Cc.) of the liquid extract.”
 <Br. Dose, $\frac{1}{2}$ to 1 fl.drachm.

It will be observed that alcohol is not used in this to extract the principles of the drug, but only as a preservative, 20% of 90 percent. alcohol being used for this purpose.

FLUIDEXTRACTUM RHAMNI PURSHIANÆ AROMATICUM. U. S.

Aromatic Fluidextract of Cascara Sagrada.

Cascara Sagrada, in No. 40 powder,	1000 Gm.
Glycyrrhiza, in No. 30 powder,	100 Gm.
Magnesium Oxide,	125 Gm.
Glycerin,	250 Cc.
Compound Spirit of Orange,	
Alcohol,	
Diluted Alcohol,	
Water, each, a sufficient quantity to make	1000 Cc.

“Mix the cascara sagrada, glycyrrhiza, and magnesium oxide thoroughly, and, having added 2000 Cc. of water, allow the mixture to macerate for 12 hours, and then dry it at a gentle heat. Mix the glycerin with 500 Cc. of alcohol and 250 Cc. of water, and, having moistened the powder with 400 Cc. of the mixture, pack it firmly in a cylindrical percolator; then add enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 48 hours. Then allow the percolation to proceed slowly, gradually adding, first, the remainder of the menstruum, and afterwards diluted alcohol, until the powder is exhausted. Reserve the first 800 Cc. of the percolate, and evaporate the remainder to a soft extract; dissolve this in the reserved portion, add the compound spirit of orange and enough diluted alcohol to make the fluid-extract measure 1000 Cc.” <U. S.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM RHEI. U. S. Fluidextract of Rhubarb.

Rhubarb, in No. 30 powder,	1000 Gm.
Alcohol,	

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of alcohol 4 volumes and water 1 volume, according to the General Formula, B.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM RHOIS GLABRÆ. U. S.

Fluidextract of Rhus Glabra. [Sumach].

Rhus Glabra, in No. 40 powder,	1000 Gm.
Glycerin,	100 Cc.
Diluted Alcohol, a sufficient quantity to make	1000 Cc.

Mix the glycerin with 900 Cc. of diluted alcohol for the first menstruum, and continue the percolation with diluted alcohol until the drug is exhausted. Reserve the first 800 Cc. of the percolate, evaporate the remainder to a soft extract; dissolve this in the reserved por-

tion, and add enough diluted alcohol to make the fluidextract measure 1000 Cc.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM ROSÆ. U. S. Fluidextract of Rose.

Red Rose, in No. 20 powder,	1000 Gm.
Glycerin,	100 Cc.
Diluted Alcohol, a sufficient quantity to make	1000 Cc.

Mix the glycerin with 900 Cc. of diluted alcohol for the first menstruum, and continue the percolation with diluted alcohol until the drug is exhausted. Reserve the first 750 Cc. of the percolate and evaporate the remainder at a temperature not exceeding 50°C. (122° F.), to a soft extract; dissolve this in the reserved portion, and add enough diluted alcohol to make the fluidextract measure 1000 Cc.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM RUBI. U. S. Fluidextract of Rubus.
[Blackberry].

Rubus, in No. 40 powder,	100 Gm.
Diluted Alcohol, a sufficient quantity to make	1000 Cc.

Prepare a fluidextract with diluted alcohol as the menstruum according to the General Formula, F.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM SABINÆ. U. S. Fluidextract of Savin.

Savin, in No. 40 powder,	1000 Gm.
Alcohol, a sufficient quantity to make	1000 Cc.

Prepare a fluidextract, with alcohol as the menstruum, according to the General Formula, A.

Average dose.—0.3 Cc. (5 minims).

FLUIDEXTRACTUM SANGUINARIÆ. U. S.

Fluidextract of Sanguinaria. [Bloodroot].

Sanguinaria, in No. 30 powder,	1000 Gm.
Acetic Acid,	

Water, each, a sufficient quantity to make	1000 Cc.
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Mix 275 Cc. of acetic acid with 725 Cc. of water as a menstruum, and prepare a fluidextract, percolating the drug with menstruum mixed in the same proportions until exhausted. Reserve the first 850 Cc. of the percolate and evaporate the remainder to a soft extract; dissolve this in the reserved portion, and add enough menstruum to make the fluidextract measure 1000 Cc.

Average dose.—0.1 Cc. (1½ minims).

FLUIDEXTRACTUM SARSAPARILLÆ. U. S.

Fluidextract of Sarsaparilla.

Sarsaparilla, in No. 30 powder,	1000 Gm.
Alcohol,	
Water, each, a sufficient quantity to make	1000 Cc.

Prepare a fluidextract with a menstruum of alcohol 1 volume and water 2 volumes, according to the General Formula, H.

Average dose.—2 Cc. (30 minims).

Extractum Sarsæ Liquidum. Br. Liquid Extract of Sarsaparilla.

Sarsaparilla, in No. 30 powder, 20 ounces or 1000 Gm.

Alcohol, (20%), a sufficient quantity,

Glycerin, 2 fl.ounces or 100 Cc.

Prepare a liquid extract by the repercolation process, using alcohol (20%) as the menstruum and collecting from the third percolator 18 fl.ounces (or 900 Cc.). To this add the glycerin to produce 20 fl.ounces (or 1000 Cc.) of the liquid extract. Dose, 2 to 4 fl.drachms.

FLUIDEXTRACTUM SARSAPARILLÆ COMPOSITUM. U. S.

Compound Fluidextract of Sarsaparilla.

Sarsaparilla, in No. 30 powder, 750 Gm.

Glycyrrhiza, in No. 30 powder, 120 Gm.

Mezereum, in No. 30 powder, 30 Gm.

Sassafras, in No. 30 powder, 100 Gm.

Glycerin, 100 Cc.

Diluted Alcohol, a sufficient quantity to make 1000 Cc.

Mix the glycerin with diluted alcohol 900 Cc. for the first menstruum, and, having mixed the powders, prepare a fluidextract, using this menstruum first and continuing the percolation with diluted alcohol until the drugs are exhausted. Reserve the first 800 Cc. of the percolate, and evaporate the remainder to a soft extract; dissolve this in the reserved portion and add enough diluted alcohol to make the fluidextract measure 1000 Cc.

Average dose.—2 Cc. (30 minims):

This is, probably, the most used of any of the fluidextracts, and may be advantageously prepared by druggists, larger quantities being more economically made than the quantities stated in the formula.

FLUIDEXTRACTUM SCILLÆ. U. S. Fluidextract of Squill.

Squill, in No. 20 powder, 1000 Gm.

Acetic Acid,

Water, each, a sufficient quantity to make 1000 Cc.

Mix 275 Cc. of acetic acid with 725 Cc. of water and prepare a fluidextract, using this mixture as the first menstruum for macerating and percolation, and continuing the percolation slowly with menstruum of the same kind until 1000 Cc. of percolate has passed.

Average dose.—0.1 Cc. (1½ minims).

It will be noted that no evaporation is directed in this, the fluidextract being finished when the required quantity of percolate is received. This is one of the three official fluidextracts in which acetic acid and water only, is the menstruum. Manufacturers furnish a line

of Fluid-acet-extracts prepared in a similar manner, Squibb's list including about 75 kinds.

FLUIDEXTRACTUM SCOPOLÆ. U. S. Fluidextract of Scopol.

Scopola, in No. 40 powder, 1000 Gm.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of alcohol 4 volumes and water 1 volume, according to the General Formula, B.

An assay process for this fluidextract is given in the U. S. P., the assay being identical with the assay for fluidextract of belladonna, and requiring that each 100 Cc. of the fluidextract shall contain 0.5 Gm. of the mydriatic alkaloids of scopol.

Average dose.—0.05 Cc. (1 minim).

FLUIDEXTRACTUM SCUTELLARIÆ. U. S.

Fluidextract of Scutellaria. [Scullcap].

Scutellaria, in No. 40 powder, 1000 Gm.

Diluted Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with diluted alcohol as the menstruum, according to the General Formula, F.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM SENEGÆ. U. S. Fluidextract of Senega.

Senega, in No. 40 powder, 1000 Gm.

Solution of Potassium Hydroxide, 30 Cc.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Mix the solution of potassium hydroxide with alcohol 600 Cc. and water 300 Cc. for the first menstruum and continue the percolation with a menstruum of alcohol 2 volumes and water 1 volume until the drug is exhausted. Reserve the first 850 Cc. of the percolate and evaporate the remainder in a porcelain dish to a soft extract; dissolve this in the reserved portion and add enough menstruum to make the fluidextract measure 100 Cc.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM SENNÆ. U. S. Fluidextract of Senna.

Senna, in No. 40 powder, 1000 Gm.

Alcohol,

Diluted Alcohol, each, a sufficient quantity to make 1000 Cc.

“Moisten the powder with 350 Cc. of alcohol, pack it firmly in a cylindrical percolator, and percolate it with alcohol until the senna is exhausted. The alcoholic percolate thus obtained is to be rejected. Remove the powder from the percolator, dry it, and, having moistened

it with 400 Cc. of diluted alcohol, pack it firmly in a cylindrical percolator; etc.” < U. S.

Proceed with the process of making a fluidextract with diluted alcohol as the menstruum, according to the General Formula, F.

Average dose.—2 Cc. (30 minims).

In making this fluidextract the senna is first “alcoholized” as directed to remove from it the principle which causes griping. After this is done the fluidextract is prepared with diluted alcohol the same as any fluidextract. The alcohol first used may be recovered by distillation.

FLUIDEXTRACTUM SERPENTARIÆ. U. S.

Fluidextract of Serpentaria.

Serpentaria, in No. 30 powder, 1000 Gm.
Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of alcohol 4 volumes and water 1 volume, according to the General Formula, B.

Average dose.—1 Cc. (15 minims).

FLUIDEXTRACTUM SPIGELIÆ. U. S. Fluidextract of Spigelia.

[Pink Root].

Spigelia, in No. 40 powder, 1000 Gm.

Diluted Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract, with diluted alcohol as the menstruum, according to the General Formula, F.

Average dose.—4 Cc. (1 fl.drachm).

FLUIDEXTRACTUM STAPHISAGRIÆ. U. S.

Fluidextract of Staphisagria. [Stavesacre].

Staphisagria, in No. 40 powder, 1000 Gm.
Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of alcohol 4 volumes and water 1 volume, according to the General Formula, B.

Average dose.—0.05 Cc. (1 minim).

FLUIDEXTRACTUM STILLINGIÆ. U. S.

Fluidextract of Stillingia.

Stillingia, in No. 40 powder, 1000 Gm.

Diluted Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with diluted alcohol as the menstruum, according to the General Formula, F.

Average dose.—2 Cc. (30 minims).

FLUIDEXTRACTUM STRAMONII. U. S.**Fluidextract of Stramonium.**

Stramonium, in No. 40 powder, 1000 Gm.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of alcohol 2 volumes and water 1 volume, according to the General Formula, E.

An assay process for this fluidextract is given in the U. S. P. which is identical to the assay process given for fluidextract of belladonna root, and requires that 100 minims shall contain 0.35 Gm. of the mydriatic alkaloids from stramonium.

Average dose.—0.05 Cc. (1 minim).

FLUIDEXTRACTUM SUMBUL. U. S. Fluidextract of Sumbul.**[Musk Root].**

Sumbul, in No. 30 powder, 1000 Gm.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of alcohol 3 volumes and water 1 volume, according to the General Formula, C.

Average dose.—2 Cc. (30 minims).

FLUIDEXTRACTUM TARAXICI. U. S.**Fluidextract of Taraxacum. [Dandelion].**

Taraxacum, in No. 30 powder, 1000 Gm.

Solution of Sodium Hydroxide, 50 Cc.

Diluted Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with diluted alcohol as the menstruum in the usual way, according to the General Formula, F.; but, after dissolving the soft extract in the reserved portion add the solution of sodium hydroxide and enough diluted alcohol to make the fluidextract measure 1000 Cc.

Average dose.—8 Cc. (2 fl.drachms).

Extractum Taraxici Liquidum. Br. Liquid Extract of Taraxacum.

Taraxacum Root, dried, in No. 20 powder, 1000 Gm.

Alcohol, 60 percent.), 2000 Cc.

Distilled Water, a sufficient quantity.

"Mix the powdered taraxacum root with the alcohol; set aside in a closed vessel for 48 hours; press out 10 fl.ounces (or 500 Cc.) of liquid; set the latter aside; mix the pressed residue with 40 fl.ounces (or 2000 Cc.) of the distilled water; set aside for 48 hours; press out and strain the liquid; evaporate to about 10 fl.ounces (or 500 Cc.); mix the two liquids; if necessary make up the volume to 20 fl.ounces (or 1000 Cc.) by the addition of distilled water; filter." <Br.

Dose, $\frac{1}{2}$ to 2 fl.drachms.

FLUIDEXTRACTUM TRITICI. U. S.**Fluidextract of Triticum. [Couch Grass].**

Triticum, finely cut, 1000 Gm.

Alcohol,

Diluted Alcohol, a sufficient quantity to make 1000 Cc.

"Pack the triticum in a cylindrical metallic percolator, pour boiling water upon it, and allow the percolation to proceed, supplying boiling water, as required, until the triticum is exhausted. Evaporate the percolate to 750 Cc., and, having added to it the 250 Cc. of alcohol, mix well and set aside for 48 hours. Then filter the liquid and add to the filtrate enough of the mixture of alcohol and water made in the proportion of 1 volume of alcohol to 3 volumes of water to make the fluidextract measure 1000 Cc." < U. S.

Average dose.—8 Cc. (2 fl.drachms).

FLUIDEXTRACTUM UVA URSI. U. S.**Fluidextract of Uva Ursi.**

Uva Ursi, in No. 30 powder, 1000 Gm.

Glycerin, 300 Cc.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Mix the glycerin with alcohol 200 Cc. and water 500 Cc. as the first menstruum, and continue the percolation with a menstruum of alcohol 2 volumes and water 5 volumes until the drug is exhausted. Reserve the first 800 Cc. of the percolate and evaporate the remainder at a temperature not exceeding 50°C. (122°F.) to a soft extract; dissolve this in the reserved portion and add enough of the mixture of alcohol and water to make the fluidextract measure 1000 Cc.

Average dose.—2 Cc. (30 minims).

FLUIDEXTRACTUM VALERIANÆ. U. S.**Fluidextract of Valerian.**

Valerian, in No. 40 powder, 1000 Gm.

Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of alcohol 3 volumes and water 1 volume, according to the General Formula, C.

Average dose.—2 Cc. (30 minims).

FLUIDEXTRACTUM VERATRI. U. S. Fluidextract of Veratrum.

Veratrum, in No. 60 powder, 1000 Gm.

Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with alcohol as the menstruum, according to the General Formula, A.

Average dose.—0.1 Cc. (1½ minims).

FLUIDEXTRACTUM VIBURNI OPULI. U. S.

Fluidextract of Viburnum Opulus. [Cramp Bark].

Viburnum Opulus, in No. 40 powder, 1000 Gm.
Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of alcohol 2 volumes and water 1 volume, according to the General Formula, E.

Average dose.—2 Cc. (30 minims).

FLUIDEXTRACTUM VIBURNI PRUNIFOLII. U. S.

Fluidextract of Viburnum Prunifolium. [Black Haw].

Viburnum Prunifolium, in No. 40 powder, 1000 Gm.
Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of alcohol 2 volumes and water 1 volume, according to the General Formula, E.

Average dose.—2 Cc. (30 minims).

FLUIDEXTRACTUM XANTHOXYLI. U. S.

Fluidextract of Xanthoxylum. [Prickly Ash].

Xanthoxylum, in No. 40 powder, 1000 Gm.
Alcohol,

Water, each, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with a menstruum of alcohol 3 volumes and water 1 volume, according to the General Formula, C.

Average dose.—2 Cc. (30 minims).

FLUIDEXTRACTUM ZINGIBERIS. U. S. Fluidextract of Ginger.

Ginger, in No. 50 powder, 1000 Gm.

Alcohol, a sufficient quantity to make 1000 Cc.

Prepare a fluidextract with alcohol as the menstruum, according to the General Formula, A.

Average dose.—1 Cc. (15 minims).

UNOFFICIAL FLUIDEXTRACTS.

The foregoing official fluidextracts represent the greater part of those in active use by the medical profession; but they are only a small part of the number prepared by manufacturers, for which there is more or less limited demand. Some druggists carry stocks of nearly all the fluidextracts listed by manufacturers, in order to have them, if called for, or to use them for preparing extemporaneously, various other preparations of the drugs which they represent, as infusions, tinctures, vinegars etc., or small quantities of solid extracts, thus saving the necessity and expense of keeping made up and on hand the large variety of preparations that they would, otherwise, be obliged to

carry. It is a good idea for druggists to have on hand, if only in small quantities, a very complete line of fluidextracts. They can be purchased in 4-ounce bottles of manufacturers and it is less expensive for druggists than to carry stock of the great variety of vegetable drugs, which deteriorate by keeping, and for which there is seldom call, except as represented in some fluid preparations.

While it is not profitable for retail druggists to make the very small quantities of many of the unofficial fluidextracts which they may require, they may make such as are needed in larger quantities with satisfaction and profit.

While the process of water-bath percolation is recommended for preparing fluidextracts, the other processes which are noted in the beginning of the article on Fluidextracts give very satisfactory results, and may, perhaps, be more conveniently used by retail druggists, unless they are equipped with an apparatus for water-bath percolation.

The method of classifying the official fluidextract formulas in this work saves a great amount of space which would otherwise be required and which would, in itself, fill a large volume. In making unofficial fluidextracts it is only necessary to understand the preliminary instructions and put the name of the drug into the formula for the class designated to have a complete working formula for any required fluidextract.

In the Organic Materia Medica section of this work—Part I., pages 106 to 236—most of the drugs from which fluidextracts are prepared are described, and their fluidextracts mentioned with dose and, generally, the menstruum that should be used in preparing them. It is only necessary to use the name of the drug and the menstruum required—the same as in the official formulas—to make a complete formula for most of the unofficial fluidextracts, and in this way much valuable space is saved in this book.

Aqueous Fluidextracts.

In this class of fluidextracts are included all those in which water is mainly employed for extracting their medicinal virtues, and in which alcohol would be objectionable, either as a menstruum or for the uses required. In some, however, alcohol is added as a preservative.

But few aqueous fluidextracts are used, but it is evident that a larger variety might be employed with advantage by the profession. Any drug which yields its medicinal value to water may very properly be exhibited in an aqueous fluidextract, and the formulæ which follow will be sufficiently explicit for making any preparation of this kind that may be desired.

Several aqueous fluidextracts are given in the U. S. P. and in the Br. P. under the name of liquid extracts.

Fluidextract Bael Fruit. Bengal Quince. Indian Bael. Bael fruit, cut in pieces, 16 ounces av.; water 15 pints, alcohol 3 fl.ounces. Put the bael fruit loosely in a water-bath percolator, pour upon it 5 pints of water and macerate in a warm place for 12 hours, then draw off the liquid by the stop-cock and reserve. Pour on the drug again 5 pints of water, macerate for 2 hours and draw off as before. Press the marc. Mix the liquids, evaporate them by gentle heat to 13 fl.ounces and after straining add 3 fl.ounces of alcohol to preserve the extract and complete the measure. This is an astringent aromatic demulcent, but is little used in this country.

Fluidextract of Broom Tops, Aqueous. *Sarothamnus Scoparius*. Broom tops, in No. 20 powder, $16\frac{2}{3}$ ounces av.; glycerin 5 fl.ounces, water a sufficient quantity. Moisten the drug with 10 ounces of water and macerate for 24 hours in a warm place; then pack moderately in a water-bath percolator, pour upon it a pint of water, heat moderately, and after 1 hour begin to percolate, adding water to the drug and continuing the heat and percolation until the drug is exhausted. Evaporate the percolate to 10 fl.ounces, filter and add through the filter enough water to make 11 fl.ounces, then add the glycerin to make a pint of the fluidextract.

Fluidextract Cascara Sagrada, Aqueous. *Rhamnus Purshiana*. Cascara sagrada bark, in No. 30 powder, $16\frac{2}{3}$ ounces av.; glycerin 5 fl.ounces, water, a sufficient quantity. Mix the glycerin with a pint of water and having moistened the powder with 10 ounces of the mixture, macerate for 24 hours in a warm place; then pack moderately in the water-bath percolator, pour upon it the remainder of the mixture, heat moderately, and after 1 hour, begin to percolate, adding water to the drug and continuing the heat and percolation until the drug is exhausted. Evaporate the percolate by means of a water-bath to a pint, and after standing a few days filter through muslin.

The foregoing formulæ was published in the former editions of this work; but since then the fluidextract has been made official in several pharmacopœias. As the aqueous fluidextract seems to contain all the desirable properties of this drug this formula is retained in this section.

Fluidextract Golden Seal, Aqueous. *Hydrastis* without Alcohol. Fluid *Hydrastis*. Golden seal (*hydrastis*), in No. 30 powder, $16\frac{2}{3}$ ounces av.; glycerin 6 fl.ounces, water, a sufficient quantity. Mix the glycerin with 10 fl.ounces of water and macerate for 24 hours in a warm place; transfer to the water-bath percolator, pack moderately, pour the remainder of the liquid upon it and set in a warm place for 2 days, then heat moderately and after 1 hour begin to percolate, adding water to the drug and continuing the heat and percolation until 13 fl.ounces have passed, which reserve. Turn off the heat, continue the percolation with water until the drug is exhausted. Evaporate this last portion to 3 fl.ounces, which add to the reserved portion to make a pint of the fluidextract, and after standing a few days filter through muslin.

This formula was published in the former editions of this work; but since then several formulas for fluid *hydrastis* have been made official. They may be found elsewhere in this work.

Fluidextract Ipecac, Aqueous. *Ipecac*, in No. 30 powder, $16\frac{2}{3}$ ounces av.; glycerin 6 fl.ounces, water, a sufficient quantity. Moisten the powder with 12 ounces of water and macerate for 24 hours, then pack moderately in the water-bath percolator, pour upon it a pint of water and heat moderately at once. After 1 hour begin to percolate slowly and continue the heat and percolation until the drug is exhausted. Evaporate the percolate to 10 fl.ounces, filter, and add enough water through the filter to make 10 fl.ounces; then add the glycerin to make a pint of the extract. To make syrup of *ipecac*, mix 1 fl.ounce of this extract with 15 fl.ounces of syrup.

This formula was published in the former editions of this work and has given excellent satisfaction, particularly as a fluidextract of *ipecac* for making syrup of *ipecac* or other preparations in which the resinous matter contained in the official formula is precipitated when an aqueous diluent is added. It is therefore, retained in this work.

Fluidextract Liquorice, Aqueous. For Quinine Mixtures etc. *Liquorice* root, in No. 20 powder, $16\frac{2}{3}$ ounces av.; glycerin 5 fl.ounces, ammonia water

3 fl.ounces, water, a sufficient quantity. Mix the ammonia water with 8 ounces of water, moisten the drug with the mixture and set in a warm place for 1 day, then pack moderately in the water-bath percolator, pour upon it a pint of water, heat at once, and after 1 hour begin to percolate slowly, adding water and continuing the heat and percolation until the drug is exhausted. Reserve the first $\frac{1}{2}$ pint that passes, evaporate the remainder to 3 fl.ounces; mix it with the reserved portion and add the glycerin to make a pint of fluid extract. After standing a few days, filter through muslin. This is an excellent adjuvant for quinine and other bitter medicines.

To make elixir of liquorice for quinine mixtures, mix 2 fl.ounces of this fluid-extract with 6 fl.ounces of syrup of wild cherry and $\frac{1}{2}$ pint of simple elixir. To make syrup of liquorice mix 2 fl.ounces of the fluidextract with 14 fl.ounces of syrup.

Fluidextract of Opium, Aqueous. Powdered opium 4 ounces av., glycerin 5 fl.ounces, water, a sufficient quantity. Pour 8 ounces of boiling water upon the opium and, after macerating for 2 hours, having covered the perforated diaphragm of the water-bath percolator with a coarse piece of muslin, pour the mixture upon it, heat to about 185°F. and begin to percolate, adding water to the drug and continuing the heat and percolation until the drug is exhausted. Evaporate the percolate by means of a water-bath until it is reduced to 10 fl.ounces, filter and add enough water through the filter to make the measure 11 fl.ounces, then add the glycerin to make a pint of the fluid-extract. Each minim of this extract represents about $\frac{1}{4}$ grain opium. Manufacturers have no definite standard for fluidextract of opium, many of them making it only the same strength as the tincture.

Compound Fluidextracts.

Under this heading are included fluidextracts made from two or more powdered drugs combined. As only one compound fluidextract is official, the Latin names of the extracts are not given in this list, but only their ordinary commercial or trade names.

Compound fluidextracts may be conveniently made by mixing the fluidextracts of the drugs which compose them in the same proportions as they are directed to be used in the formulas. The prescribing and use of compound fluidextracts should be discouraged for the reason that there is no official standard for them, and, as made by different manufacturers, they represent varying proportions of the drugs composing them, and are therefore indefinite.

The following formulæ contain the essential directions for making these fluidextracts:

Fluidextract Alternative Compound. Fluidextract Bamboo Brier Compound. Bamboo brier root 4 ounces, burdock root 4 ounces, stillingia 4 ounces, poke root 4 ounces, prickly ash 1 ounce, alcohol 2 parts, water 1 part. Make a pint of fluidextract as directed by General Formula E.

Fluidextract Blackberry Compound. Blackberry root 12 $\frac{1}{2}$ ounces av., cinnamon 2 ounces av., nutmeg, coriander, each, 1 ounce av.; all in No. 40 powder; glycerin 2 fl.ounces, alcohol 2, water 1, a sufficient quantity. Make a pint of fluidextract as directed by General Formula E.

Fluidextract Black Cohosh Compound. Black cohosh, in No. 40 powder, 6 ounces av.; wild cherry, in No. 20 powder, 4 ounces av.; licorice root, in No. 30 powder, 4 ounces av.; ipecac, senega, each, in No. 40 powder, 1 ounce av.; alcohol 2, water 1, a sufficient quantity. Make a pint of fluidextract as directed by General Formula E.

Fluidextract Blue Cohosh Compound. Blue cohosh, in No. 40 powder, 8 $\frac{3}{4}$ ounces av.; cramp bark, in No. 30 powder, 3 ounces av.; unicorn root, in No. 40 powder, 3 ounces av.; celery root, in No. 40 powder, 2 ounces av.; alcohol

2, water 1, a sufficient quantity. Make a pint of fluidextract as directed by General Formula E.

Fluidextract of Buchu and Juniper with Potassium Acetate. Buchu leaves, in No. 40 powder, 8 ounces av.; juniper berries, in No. 40 powder, 4 ounces av.; potassium acetate 5 ounces av.; alcohol 2, water 1, a sufficient quantity. Make 13 ounces of fluidextract from the buchu and juniper as in class C., and add the potassium acetate.

Fluidextract Buchu and Pareira Brava. Buchu leaves, in No. 40 powder, pareira bark, in No. 50 powder, each, 8 ounces av.; alcohol 2, water 1, a sufficient quantity. Make a pint of fluidextract as directed in General Formula E.

Fluidextract Buchu Compound. Buchu leaves, juniper berries, cubebs, uva ursi, each, in No. 50 powder, 4 ounces av.; alcohol, a sufficient quantity. Make a pint of fluidextract as directed in General Formula A.

Fluidextract of Cardamom Compound. Cardamom, cinnamon, each, $6\frac{1}{2}$ ounces av.; cochineal $1\frac{1}{2}$ ounces av.; all in No. 50 powder; alcohol 3, water 1, a sufficient quantity. Make a pint of fluidextract as directed in General Formula C.

Fluidextract Cinchona Compound. Red cinchona bark, in No. 50 powder, $8\frac{1}{2}$ ounces; bitter orange peel, in No. 20 powder, $6\frac{1}{2}$ ounces av.; serpentaria, in No. 50 powder, $1\frac{1}{2}$ ounces av.; glycerin 2 fl.ounces; alcohol 3, water 1, a sufficient quantity. Make a pint of fluidextract as directed in General Formula C.

Fluidextract Colocynth Compound. Purified aloes, colocynth pulp, each, in coarse powder, $6\frac{1}{2}$ ounces av.; liquorice root, in coarse powder, resin of scammony, cardamom seed, each, in fine powder, 1 ounce av.; potassium carbonate $\frac{1}{2}$ ounce av.; alcohol 3, water 1, a sufficient quantity. Make a pint of fluidextract as directed in General Formula C.

Fluidextract Dandelion Compound. Dandelion, in No. 40 powder, $14\frac{3}{4}$ ounces av.; mandrake, in No. 40 powder, conium leaves, in No. 30 powder, each, 1 ounce av.; diluted alcohol, a sufficient quantity. Make a pint of fluidextract as directed in General Formula F.

Fluidextract Gentian Compound. Gentian, in No. 20 powder, 10 ounces av.; bitter orange peel, in No. 20 powder, 4 ounces av.; cardamom, in No. 50 powder, $2\frac{3}{4}$ ounces av.; alcohol 3, water 1, a sufficient quantity. Make a pint of fluidextract as directed in General Formula F.

Fluidextract Helonias Compound. Helonias, in No. 40 powder, 9 ounces av.; buchu, gentian, golden seal, each, in No. 30 powder, $2\frac{1}{2}$ ounces av.; alcohol 2, water 1, a sufficient quantity. Make a pint of fluidextract as directed in General Formula E.

Fluidextract Hoarhound Compound. Hoarhound, in No. 20 powder; red root, elecampane, spikenard, comfrey, wild cherry, bloodroot, each, in No. 30 powder, $2\frac{1}{4}$ ounces av.; alcohol 3, water 1, a sufficient quantity. Make a fluidextract as directed in General Formula E.

Fluidextract Ipecac and Senega. Ipecac, senega, each in No. 50 powder, $8\frac{1}{4}$ ounces av.; diluted alcohol, a sufficient quantity. Make a fluidextract as directed in General Formula F.

Fluidextract of Liquorice Compound. For Quinine Mixtures. Liquorice root 7 ounces av., wild cherry 6 ounces av., anise, coriander, caraway, each, 1 ounce av., all in No. 30 powder; alcohol 3 fl.ounces, water sufficient to make 13 fl.ounces of aqueous fluidextract, and add the alcohol.

Fluidextract of Mandrake Compound. Mandrake, in No. 50 powder, leptandra, in No. 40 powder, senna, in No. 30 powder, each, 5 ounces av.; canella, in No. 40 powder, $1\frac{1}{3}$ ounces av.; alcohol 2, water 1, a sufficient quantity. Make a pint of fluidextract as directed in General Formula E.

Fluidextract of Matico Compound. Matico, buchu, cubeb, each, in No. 40 powder, $5\frac{1}{2}$ ounces av.; alcohol, a sufficient quantity. Make a pint of fluidextract as directed in General Formula A.

Fluidextract Mitchella Compound. Mitchella (squaw vine) $9\frac{1}{2}$ ounces av., helonias root, blue cohosh, each, $2\frac{1}{2}$ ounces av.; cramp bark 2 ounces av.; all in No. 40 powder; alcohol 2, water 1, a sufficient quantity. Make a pint of fluidextract as directed in General Formula F.

Fluidextract Pink Root and Senna. Pink root, in No. 40 powder, $9\frac{1}{3}$ ounces av.; senna, in No. 30 powder, $5\frac{1}{2}$ ounces av.; caraway, anise, each, in No. 30 powder, 1 ounce av.; diluted alcohol, a sufficient quantity. Make a pint of fluidextract as directed in General Formula F.

Fluidextract Pinus Compound. For making Cough Syrup. White pine bark $4\frac{3}{8}$ ounces, wild cherry bark $4\frac{3}{8}$ ounces, poplar buds 256 grains, spikenard 256 grains, sanguinaria 244 grains, sassafras 128 grains, morphine acetate 12 grains, alcohol and water, of each sufficient to make 1 pint. Make a fluid-extract by percolating the drugs with a menstruum of 3 parts alcohol with 2 parts water, preferably by water-bath percolation.

Fluidextract Poke Root Compound. Poke root (phytolacca), black cohosh (cimicifuga), each in No. 40 powder, $6\frac{3}{4}$ ounces av.; prickly ash berries, juniper berries, each in No. 30 powder, 2 ounces av.; alcohol a sufficient quantity. Make a pint of fluidextract as directed in General Formula B.

Fluidextract of Rhubarb and Senna. Rhubarb, in No. 20 powder, 10 ounces av.; senna, in No. 20 powder, 3 ounces av.; coriander, fennel and liquorice, each, in No. 50 powder, $1\frac{1}{4}$ ounces av.; alcohol 2, water 1, a sufficient quantity. Make a pint of fluidextract as directed in General Formula F.

Fluidextract of Rhubarb, Aromatic. Rhubarb, in No. 20 powder, $10\frac{1}{2}$ ounces av.; cloves, cinnamon, each in No. 30 powder, 2 ounces av.; nutmeg, in No. 50 powder, 1 ounce av.; potassium carbonate $\frac{1}{2}$ ounce av.; alcohol 3, water 1, a sufficient quantity. Make a fluidextract as directed in General Formula C.

Fluidextract of Rumex Compound. Compound Fluidextract of Yellow Dock. Yellow dock root, in No. 20 powder, $8\frac{1}{3}$ ounces av.; false bitter-sweet bark, in No. 30 powder, $4\frac{1}{3}$ ounces av.; American ivy bark, figwort, each in No. 30 powder, 2 ounce av.; diluted alcohol a sufficient quantity. Make a pint of fluidextract as directed in General Formula F.

Fluidextractum Sarsaparillæ Compositum. U. S. This is the only compound fluidextract official in the U. S. P. The formula is on page 705.

Fluidextract Sarsaparilla and Dandelion. Sarsaparilla, dandelion, each in No. 30 powder, $8\frac{1}{3}$ ounces av.; diluted alcohol a sufficient quantity. Make a pint of fluidextract as directed in General Formula F.

Fluidextract Saw Palmetto Compound. Fresh saw palmetto berries $2\frac{3}{4}$ ounces, kola nut 384 grains, parsley seed and coca, of each, 192 grains; cinnamon $\frac{1}{4}$ ounce, orange peel $\frac{1}{2}$ ounce, cardamom seeds 60 grains, alcohol and water, of each, a sufficient quantity. Macerate the drugs in powder with 6 ounces of alcohol, and after 24 hours pack in a percolator with a mixture of 2 parts of alcohol with 1 part of water to produce a pint of fluidextract.

Fluidextract Skullcap Compound. Skullcap, in No. 20 powder, $6\frac{2}{3}$ ounces av.; cypripedium, in No. 40 powder, 4 ounces av.; hops, wild lettuce, each, in No. 20 powder, 3 ounces av.; alcohol 2, water 1, a sufficient quantity. Make a pint of fluidextract as directed in General Formula F.

Fluidextract Senna Compound. Senna, in No. 30 powder, $8\frac{2}{3}$ ounces av.; rhubarb, in No. 20 powder, 4 ounces av.; jalap, mandrake, each, in No. 50 powder, 2 ounces av.; alcohol 2, water 1, a sufficient quantity. Make a pint of fluidextract as directed in General Formula E.

Fluidextract Spikenard Compound. Compound Fluidextract of Aralia. Spikenard root, yellow dock root, burdock root, guaiac wood, sassafras bark, each, in No. 20 powder, $2\frac{1}{2}$ ounces av.; Southern prickly ash, elder flowers, blue flag root, each, in No. 30 powder, 2 ounces av.; diluted alcohol, a sufficient quantity. Make a pint of fluidextract as directed in General Formula F.

Fluidextract Squill, or Scilla Compound. Squill, in No. 20 powder, senega, in No. 40 powder, each, $8\frac{1}{3}$ ounces av.; ammonia water $\frac{1}{2}$ fl.ounce, alcohol 2, water 1, a sufficient quantity. Make a pint of fluidextract as directed in General Formula E.

Fluidextract Stillingia Compound. Stillingia, turkey corn, each, 4 ounces av.; elder flowers, blue flag, pipsissewa, each, 2 ounces av.; coriander seed, prickly ash bark, each, 1 ounce av.; all in No. 30 powder; alcohol 2, water 1, a sufficient quantity. Make a pint of fluidextract as directed in General Formula E.

Fluidextract Wild Cherry Compound. Wild cherry, in No. 20 powder, $8\frac{2}{3}$ av.; ounces av.; hoarhound, wild lettuce, each, in No. 20 powder, 3 ounces av.;

American hellebore, bloodroot, each, in No. 40 powder, 1 ounce av.; alcohol 2, water 1, a sufficient quantity. Make a pint of fluidextract as directed in General Formula E.

Fluidextract Yerba Santa, Aromatic. This is prepared with the same drugs as are directed for making Elixir Yerba Santa Compound, and they are employed in the same quantities, but a pint of fluidextract is made with a sufficient quantity of alcohol, glycerin and water mixed in the same proportion as directed in that formula.

Other Compound Fluidextracts. The foregoing formulæ for compound fluidextracts represents nearly all that are at present quoted by manufacturers, but other combinations will, no doubt, be added, and it is only necessary for the intelligent druggist to follow the data given here to prepare any compound fluidextract that may be desired.

For ordinary requirements of the retail business it will be much better to prepare these by mixing fluidextracts of the drugs directed, instead of from the crude drugs themselves, except it be those of which considerable quantities are used.

Unofficial Fluidextracts Requiring Special Treatment.

Official fluidextracts requiring special treatment are provided for in the official list of formulas; the following are unofficial fluidextracts requiring special treatment, which cannot well be included under the General Formulas, pages 684 to 686:

Fluidextract of Cinchona, Detannated. Mix 6 ounces of freshly precipitated, washed, moist hydrated iron peroxide (ferric hydrate) with a pint of fluidextract of cinchona and allow to stand for four days, shaking frequently; then filter, adding through the filter enough diluted alcohol to make the measure a pint. If the filtered extract still shows traces of tannin when tested with tincture of iron chloride, add an ounce more of moist ferric hydrate, and proceed as before until it is detannated.

Fluidextract of Hydrastis, Purified. Hydrastis, in No. 50 powder, 16½ ounces av., glycerin 5 ounces, alcohol, water, each, a sufficient quantity. Moisten the powder with 8 ounces of alcohol and pack firmly in the water-bath percolator, pour upon it a pint of alcohol and set in a warm place for two days; then heat very moderately and after one hour begin to percolate, adding alcohol to the drug and continuing the heat and percolation until it is exhausted. Distil the alcohol from the percolate until it is reduced to a soft extract. To this add the glycerin and 6 ounces of water, and agitate, then filter and add through the filter enough water to make a pint of the fluidextract. The resinous matter remains on the filter. This makes a preparation similar to "fluid hydrastis," containing the valuable principles of the drug which are soluble in an aqueous menstruum and omitting the objectionable ones that are obtained when water or alcohol alone is used as a menstruum.

Fluidextract Ignatia Bean. Ignatia bean in No. 60 powder, 16¾ ounces av., alcohol, water, each, a sufficient quantity. This fluidextract is made with the same menstruum and in precisely the same manner as fluidextract of nuxvomica, which see.

Fluidextract Pinus Canadensis, Colorless. A fluidextract is prepared from hemlock bark, exhausting it by percolation with hot water, and evaporating the percolate until a pint contains the strength of a pound of the bark. This fluidextract is then treated with moist ferric hydrate, a sufficient quantity to detannate, and the filtered liquid is again filtered through animal charcoal to remove any color and afterwards evaporated and alcohol 25% added, so that the finished product shall make one pint for each pound of the bark taken.

Fluidextract Vanilla (One-half strength). Vanilla, 8 ounces av., alcohol, water, each, a sufficient quantity. Mix three measures of alcohol with two measures of water, and having cut the vanilla in fine pieces and reduced it to a coarse powder by thoroughly beating it in a mortar, moisten it with 6 ounces of the menstruum, pack firmly in the water-bath percolator, pour upon it 10

ounces of the menstruum and set in a warm place for seven days; then heat moderately and after one hour begin to percolate slowly, adding menstruum to the drug and continuing the heat and percolation until $14\frac{1}{2}$ fl.ounces have passed, which reserve. Continue the percolation with the menstruum until the drug is exhausted, then distil the alcohol from the last portion, evaporate the residue to a soft extract, add to the reserved portion, and afterwards sufficient menstruum to make a pint of the fluidextract. After standing a few days, filter through muslin.

It will be observed that this is but half the strength of ordinary fluidextracts. It is thus made because a fluidextract of full strength cannot be obtained without impairing the flavor of the preparation by the heat required to evaporate it.

To make Flavoring Extract of Vanilla from this fluidextract use from 1 to 2 ounces, with enough alcohol and water mixed in the proportion of three measures of alcohol to two of water to make a pint.

To make Tincture of Vanilla, U. S., use $1\frac{1}{2}$ fl.ounces of this fluidextract with enough alcohol and water, mixed as above, to make a pint.

Fluidextract Wild Cherry, Detannated. Mix 6 ounces freshly precipitated, moist hydrated iron peroxide (ferric hydrate) with a pint of fluidextract of wild cherry, and allow to stand for four days, shaking frequently; then filter, adding through the filter enough diluted alcohol to make the measure a pint.

If the filtered extract still shows traces of tannin when tested with tincture of iron chloride, add an ounce more of the moist ferric hydrate and proceed as before until it is detannated.

Acetic Fluidextracts.

In the U. S. P. three formulas for fluidextracts are prepared with diluted acetic acid as the menstruum and several others contain acetic acid as a portion of the menstruum with which the drug is exhausted. Squibb lists about 75 Fluid-acet-extracts, in which diluted acetic acid is used as a menstruum and preservative in the same manner as alcohol is used in fluidextracts generally. In these fluidextracts Squibb claims that acetic acid extracts "all the requisite principles of the drug and in some instances, like valerian and digitalis it leaves behind oils and fats, the presence of which, in a fluidextract is undesirable." There is no doubt that, in the fluidextracts where diluted acetic acid may be used it is of much value as a menstruum and produces a fluidextract of which the relative medicinal value and permanence cannot be questioned.

General Formula for Acetic Fluidextracts.

The formulæ for preparing these fluidextracts may generally be the same as the U. S. P. formula for Fluidextractum Digitalis, Fluidextractum Sanguinariae or Fluidextractum Scillae, in the official list, which see.

Etherial Fluidextracts.

Among the first fluidextracts made official in the U. S. P. were a number of preparations made with ether as a menstruum, now classed as oleoresins. Manufacturers have furnished several etherial fluidextracts which have had more or less reputation, but none are now official and they are but little used. As they are seldom prepared by druggists it is unnecessary to give formulas for them here.

Green Plant Fluidextracts.

Fluidextracts prepared from recently gathered herbs, barks, flowers, roots etc., have been extensively advertised by manufacturing houses, and some of them are deservedly popular with physicians. Although they cannot have the same uniformity of strength as fluidextracts prepared from dry drugs; yet many of them are stronger and better, especially such as depend for their medicinal value upon volatile principles, which would be lost by the process of drying. As there is no standard of strength established for green plant fluidextracts except that the liquid shall be saturated with the medicinal properties of the drug, the following general formula, which is adapted for making all of them, is given. These fluidextracts are called by some manufacturers concentrated or specific tinctures:

General Formula for Green Plant Fluidextracts.

The fresh drug, cut, bruised, crushed, grated, chopped or otherwise reduced to proper fineness for macerating and percolating, a convenient quantity; alcohol, a sufficient quantity. Having reduced the drug to its proper fineness, pack it in the water-bath percolator, pour sufficient alcohol upon it to saturate and cover it, and set in a warm place for two days; then heat very moderately and, after one hour, begin to percolate slowly, and continue until the liquid ceases to drop. Reserve this portion and continue the percolation with alcohol until the drug is exhausted. Distil the alcohol from this last portion until the residue is reduced to the consistence of thin syrup, which add to the reserved portion to complete the fluidextract. The alcohol remaining in the drug after percolation may be recovered by distillation.

Some drugs should be macerated as soon as gathered and some should be partly dried before maceration. Herbs should be gathered in their flowering season, roots should generally be gathered in autumn and barks in the early spring.

Fluidextracts of Gums, Resins, Etc.

This class of preparations (which are not, in fact, fluidextracts as the term is generally applied, but which might much more properly be called Fluids, as Fluid Aloes etc.) seem superfluous, and would not here be given but for the reason that they are quoted and supplied by many manufacturers and will therefore be demanded by druggists.

They are seldom used except to prepare tinctures or other preparations which would be much better made from the substances themselves. They generally represent about 50 percent. of the drug from which they are prepared, although it cannot be said for all of them that they represent as much as is claimed for them.

FOLIA — LEAVES.

In botany leaves are the organs by which plants absorb gases which are converted into cellular tissue and other plant nourishment.

In pharmacy fresh or dried leaves are used for medicinal purposes, and the name is applied to all manner of leaves of plants, and sometimes to the petals of flowers.

In the U. S. and some of the European pharmacopœias only the name of the plant from which leaves are obtained is given, as buchu, senna etc. In the Br. P. the Latin name of the plant is followed by the word "Folia," as Buchu Folia etc., and the common title has the name of the plant preceding the word "leaves," as Buchu leaves etc. In some of the other pharmacopœias the Latin word Folia precedes the name of the plant, as Folia Buchu etc.

As all of the U. S. and Br. P. leaves are described in this work in the alphabetical order of subjects, and those not official are mostly noted elsewhere, they will not be further considered under this heading.

FLUORINE.

Symbol F; Atomic weight 19; Sp. gr. 1.26.

This element completes (or may rather be said begins) the list of halogen elements. Until recently but little has been known of this element except from its compounds. Theoretically it has been assigned a place with the halogens because of its general characteristics. It was isolated in November, 1886, by M. H. Moissan, of Paris, who obtained it as a yellowish-green inflammable gas from anhydrous fluoric acid, by electrolysis. This same gentleman improved the process of manufacture and obtained it in sufficient quantities to establish its characteristics as an element. Since then much has been learned about this element and many compounds of it have been investigated.

Fluorine Compounds. Fluorine is the most energetic element known but it is chiefly used in its compound with hydrogen, as hydrofluoric acid, for etching glass. Its compounds are similar to those of the other halogen elements. Its compound with hydrogen, hydrofluoric acid, HF, reacts with metallic substances, forming fluorides. It also combines with boron and silicon forming gaseous compounds. Hydrofluoric acid is used for etching and corroding glass, it vaporizes at 59°F., and on account of its action upon glass must be kept in leaden, gutta-percha or wax-coated bottles.

Fluorine and its compounds are more fully described in the Chemical Section, Part I.

FORMALDEHYDUM — FORMALDEHYDE.



Formaldehyde gas was discovered in 1867 by von Hoffmann, who obtained it by passing vapor of wood alcohol mixed with air, over finely divided platinum, heated to redness. The chemical formula of the gas is HCOH. It was first known as **Formol**, but was brought

into prominence as a germicide by the researches of Berlioz and Trillatin 1892. The solution of this gas in water is known as Formaldehyde, or Formalin. A 10% solution was formerly furnished but at present the 40% solution is generally known in the market as Formaldehyde. Some manufacturing chemists also furnish a 40% solution for vaporizing which they call **Formalin** to distinguish it from other solutions of formaldehyde which might not be that percentage.

It is a powerful preservative and is much employed in dilute solution for preserving anatomical specimens, and is reputed to be used as a preservative for milk and other articles of food, but should not be used for such purposes. It is also vaporized as a disinfectant and germicide to destroy germs of contagious diseases, and has been used in this manner for disinfecting books of public libraries, paper money in banks etc.

It has also been used in very dilute solution as a wash or surgical application and may be made into the form of ointments with lanolin, or used in glycerin or other suitable vehicle as an application. Pastils of formaldehyde are also prepared and it is an ingredient in many catarrh inhalers.

Liquor Formaldehydi. U. S. Solution of Formaldehyde.

This is now official in the U. S. P. It is an aqueous solution of the gas containing not less than 37 percent., by weight, of absolute formaldehyde. See the above title under Liquores.

Formaldehydum Solutum, Formaldehydlösung, is official in the Ph. Ger. This solution contains 35% of the gas and has sp. gr. 1.079.

This solution is used as a preservative for liquids, 1:5000 to 1:50000 being required to preserve fruit juices, beer, wine, cider, etc., but its use for such purposes is now prohibited.

A larger percentage, 1:100 to 1:5000, is used for preserving plants, vegetables and fruits, used as specimens, and for anatomical specimens; in embalming fluids etc. Formaldehyde is also used for destroying germs in an infected room, and in closed chambers, for sterilizing books in public libraries, currency in banks etc. It is vaporized by heating the solution in a basin or other vessel, the vapor acting as a germicide.

Formaldehyde Combinations.

A great many combinations of formaldehyde with other substances are known under trade names; the more important are

Formalbumin. A combination of casein with formaldehyde.

Formaldehyde-Gelatin. A combination of gelatin with formaldehyde, known as **Glutol**.

Formaldehyde-Tannin. A compound with tannin known as **formaton** or **tannoform**.

Formanilid. A combination of anilin and formic acid: phenyl-formamide.

Formasal. A condensation product of formaldehyde and salicylic acid.

Formatone. A liquid preparation holding in solution five formate salts, therefore known as solution of pentaformates.

Formopyrine. A compound made by heating together for several hours at 120°C. antipyrin 5 parts and solution of formaldehyde 4 parts.

See also the titles *Liquor Formaldehydi*, and *Hexamethylamina*.

FRUCTUS — FRUITS.

In botany and pharmacy the term Fruit represents a great variety of the products of vegetation. In a botanical sense, fruit is the matured seed vessel and its contents and coverings. The peach and apple are examples of fleshy fruits; berries of various kinds are examples of other kind of fruits; nuts, another kind of fruits; the grains and a great variety of seeds are other kinds of fruit.

In the U. S. P. fruit is generally given the name of the plant from which it is obtained, as *Carum*, Caraway, for Caraway fruit etc., but when leaves and seeds are both official they are designated—as *Stramonii Semen* for Stramonium Seed etc. In the Br. P. the name of the plant is followed by the word “Fructus” or “Semina,” as *Carui Fructus*, Caraway Fruit; *Stramonii Semina*, Stramonium Seeds etc.

As all of the U. S. and Br. fruits are described in this work in the alphabetical order of subjects, and those not official are mostly noted elsewhere, they will not be further considered under this heading.

GAMBIR. U. S. Gambir.

[To replace *Catechu*, Pharm. 1890].

“An extract prepared from the leaves and twigs of *Ourouparia Gambir* (Hunter) *Baillou* (Fam. *Rubiaceæ*).” <U. S.

This extract has formerly been called *Catechu* in the U. S. and is now known by that name in the Br. and most of the pharmacopœias.

This extract, which has formerly been known as catechu is, as now official in “irregular masses or cubes, externally reddish-brown, pale brownish gray or light brown; fracture dull-earthly, friable, crystalline, inodorous, bitterish, very astringent, with a sweetish after taste; free from starch.” Not less than 70 percent. should be soluble in alcohol. *Catechu* as it has been formerly known, in pharmacy, in its purified form, is an almost black mass, which may readily be broken, and in the market has been furnished in boxes, holding about 12 pounds, or in $\frac{1}{4}$, $\frac{1}{2}$ or 1 pound card-board boxes. The crude extract is furnished in mats of about 112 pounds. In this form it is known commercially as *cutch* or *terra japonica*, and is used for dyeing and tanning.

Average dose.—1 Gm. (15 grains).

GAUZES.

The use of medicated gauze as antiseptic dressing for wounds, amputations, surgical operations, ulcers etc., has come into prominence during the past few years. They are chiefly prepared by manufacturers who have facilities for making them. They are prepared in a general manner as follows:

Prepared Gauze.

Ordinary unbleached gauze is first boiled in a 2 percent. solution of sodium hydrate for several hours to saponify the natural oil in the fiber, remove wood, gum and other impurities. The operation is repeated in a weaker solution, the gauze washed well, passed through a bath of a $\frac{1}{2}$ percent. hydrochloric or sulphuric acid solution, washed again and immersed in a solution of chlorinated lime (about 1° Twaddle) and bleached perfectly white. Again wash and pass through the acid bath; wash once more; extract as much water as possible with wringer or centrifugal extractor, and dry.

The strength of the medicating solution depends on the degree of pressure which it is practical to give the gauze after treatment, and the weight of material which will remain in the gauze after drying. With good calendars it can be pressed so that 100 parts of gauze will weigh 210 parts immediately after.

The following formulas for solutions for medicating the gauze are recommended:

Boric Acid Gauze. A solution is prepared with boric acid, in powder, 100 parts; Venice turpentine 10 parts, alcohol (90%), 1890 parts. Prepared gauze 220 parts is moistened with 100 parts of the solution.

Carbolized Gauze. The mixture originally employed by Dr. Lister in preparing carbolized gauze was carbolic acid 1 part, resin 5 parts, paraffin 7 parts. The formula was afterwards changed to crystallized carbolic acid 1 part, common resin 4 parts, and paraffin 4 parts. The resin and paraffin should be melted and, when the temperature is reduced to about 60°C. the carbolic acid is incorporated.

Corrosive Sublimate Gauze. The following is the formula used by the medical department of the German army: Mercuric chloride 50 parts, rectified spirits 5000 parts, distilled water 7500 parts, glycerin 2500 parts fuchsin 5 parts. Prepared gauze 150 parts is moistened with 100 parts of the solution.

Iodoform Gauze. Iodoform gauze 10 parts, alcohol, (sp. gr. .820), 40 parts; strong ether, (sp. gr. .725), 40 parts; tincture of benzoin, (1 in 5), 3 parts; glycerin 5 parts, gauze muslin, sufficient to absorb the solution. The solution may be made of different percentages of iodoform.

Salicylated Gauze. Salicylic acid 5.6 parts, glycerin 15.0 parts, rectified spirit 50.0 parts, distilled water, to make 100 parts by weight. The pharmacist working in a small way may start with plain absorbent gauze and wring out with rubber gloves or small wringer the excess of solution used, or he may make a certain weight of gauze take up all the solution, the quantity of material and liquid being properly graduated. The product cannot be uniform in any way, as the folds cause unequal expression, and the result is variation in percentage strength. In case of salicylic acid, contact with iron should be avoided, as otherwise purple stains will result.

Salol Gauze. Make a solution with salol 100 parts, Venice turpentine 50 parts, alcohol (90%), 1350 parts. Prepared gauze 165 parts is moistened with 100 parts of the solution

GELATINUM. U. S., Br. Gelatin.

"The purified, air-dried product of the hydrolysis of certain animal tissues, as skin, ligaments and bones, by treatment with boiling water." <U. S.

"The air-dried product of the action of boiling water on such animal tissues as skin, tendons, ligaments, and bones." <Br.

When animal tissues, bones, tendons, ligaments etc., are boiled for some hours in water, and the liquid allowed to stand sometime after becoming sold, a mass resembling jelly is obtained. The finer varieties of this jelly thus prepared are purified, evaporated to the proper consistence, spread into sheets, dried on nets, and are known as **Gelatin**. The coarser varieties made from hoofs, hides, and other refuse animal substances, are made into glue of various grades. Isinglass, or fish-glue, is a specie of gelatin prepared from the air-bladders of certain fish; but common gelatin is often called Isinglass.

Gelatin, prepared in various ways, is largely consumed as an article of food; in the arts it is extensively used for adhesive purposes, for making gelatin plates for photography etc., in pharmacy it is employed for coating pills, making capsules, suppositories etc., for fining wines and liquors, and for many other useful purposes.

GELATINUM GLYCERINATUM. U. S. Glycerinated Gelatin.

Gelatin,	100 Gm. or 1 ounce
Glycerin,	100 Gm. or 1 ounce
Water, a sufficient quantity to make	200 Gm. or 2 ounces

"Pour upon the gelatin sufficient water, which has been previously boiled and cooled, to cover it; allow it to stand 1 hour; pour off the water and allow the gelatin to drain for a few minutes; then transfer it to a tared dish, add the glycerin, and heat it on a water-bath until the gelatin is dissolved. Strain the solution while hot, and continue the heat on the water-bath until the product weighs 200 Gm. or 2 ounces. When cold cut the mass into pieces and preserve these in suitable containers." <U. S.

This is used for making gelatin suppositories, for which process see Suppositoria.

GLUSIDUM. Br. Gluside. Saccharin. Glucosimide.**Benzosulphinidum. U. S. Benzosulphinide.**

"Gluside, or benzol sulphonimide, is a sweet imide derivable from toluene. Its constitution is represented by the formula $C_6H_4 \cdot COS_2NH$." <Br.

This is a "light, white, minutely crystalline powder, having an intensely sweet taste in dilute solution. It is soluble in 400 parts of cold water, in 24 parts of boiling water, in 25 parts of alcohol, (90%), and but slightly soluble in ether or chloroform. It is very soluble in

dilute solution of ammonia; also in solution of sodium bicarbonate, with evolution of carbonic anhydride. A warm solution of sodium bicarbonate, when neutralized with gluside and evaporated to dryness, yields 'soluble gluside' or 'soluble saccharin,' which is very soluble in water, 100 parts of gluside yielding nearly 113 parts of neutral 'soluble gluside.' "

Preparation. According to the published patented process this is made by converting toluol into a sulphuric acid compound, and this into a sodium salt. By the action of phosphorous pentachloride, the sodium salt is then decomposed and a mixture of ortho- and para-toluol sulphochloride formed. The former isomeride is freed from the latter by cooling, (when a para modification crystallizes out), and by the action of ammonia is converted into orthotoluol-sulphamide. The next step is the oxidation of the sulphamide into ortho-sulphamin benzoic acid, which splits up into water and ortho-sulphamide benzoic anhydride or benzoyl-sulphonic imide.

Uses. This preparation, which is also known by several proprietary names, as Dulcite, Granatose, Glycosine etc., is claimed to be 500 to 600 times sweeter than cane sugar. It is also an antiseptic of considerable power. It is, therefore, used to sweeten and preserve many articles of food and in solutions and syrups. In medicine it is employed as a sweetening agent for diabetic food. In pharmacy it is used to sweeten spirits, oils, powders, solutions etc., where ordinary sugar would be insoluble or inadmissible. The soluble gluside, however, may be used to advantage in many pharmaceutical preparations, both as a sweetener and a preservative. Equal parts of saccharin and sodium bicarbonate added to quinine or other bitter powders in small proportion overcomes their bitter taste. The proportion of 5 grains each of saccharin and sodium bicarbonate to one quart of any of the official syrups ensures their keeping and improves their taste. This combination is also excellent as an addition to tooth powders and washes. It may be given in doses of 3 to 5 grains.

GLUCOSE AND GRAPE SUGAR.



Glucose, as it is known on the market, is a syrup prepared by the action of sulphuric acid on starch, aided by heat. The process by which the purified starch is transformed into glucose is called conversion, and the different grades of conversion produce quite different results. When the glucose syrup alone is wanted the process of conversion is stopped when the starch has disappeared, the product being a mixture of dextrin and glucose. This is often called dextrin syrup or starch syrup. When solid grape sugar is desired, the conversion is continued longer so as to convert the dextrin still further into dextrose or starch sugar. This sugar is extensively used as an addition to

grape juice, as by its fermentation more alcohol is produced, making a stronger wine. Many large manufacturing establishments in this country are now engaged in the manufacture of glucose and grape sugar, which are extensively sold as articles of food, and employed by confectioners for manufacturing candy. In pharmacy dextrine syrup, or glucose, is somewhat employed for sweetening preparations in place of cane syrup or sugar, as it is cheaper and less liable to fermentation. It is also fed to bees to make a greater percentage of honey. Grape sugar is used as an excipient for pills, for making masses etc., as it does not crystallize like cane sugar. Lævulose, Maltose, Mannitose, and Galactose are other glucoses derived from various substances.

A syrup of glucose is official in the Br. P. See *Syrupus Glucosi*.

Glucosides.

A class of neutral principles found in plants, which yield glucose, $C_6H_{12}O_6$, when decomposed, are called Glucosides. They comprise a great variety of substances, varying greatly in characteristics, some of them being the active medicinal agents of the plants from which they are derived, and others being of no medicinal importance. They consist of glucosidal resins, glucosidal tannins, bitter principles, sweet principles etc., some being soluble in alcohol or ether, some in water, and some in other liquids. They are variously prepared, and may be decomposed into glucose and derivative products in several different ways, some by the action of dilute mineral acids, others by alkalis, and others by the action of ferments. A few of the more important ones, as salicin, santonin etc., are official, and are noted under other headings. Their names all terminate with *in*, although all principles which terminate with *in* are not glucosides. As they are so numerous, and present such varying characteristics, they cannot well be included in a class, but are described along with other general principles of plants.

GLYCERINUM. U. S., Br. Glycerin.

"A liquid obtained by the decomposition of vegetable or animal fats, or fixed oils, and containing not less than 95 percent. of absolute glycerol, a triatomic alcohol [$CH_2OH \cdot CHOH \cdot CH_2OH = 91.37$]." <U. S.

"Glycerin, or glycerol, is a trihydric alcohol, associated with a small percentage of water; it is obtained by the interaction of alkalis, or of superheated steam, with fats and fixed oils." <Br.

Glycerin, as found on the market, is a sweet, viscid, colorless liquid of about 1.250 sp. gr., and the consistence of thick syrup. It was first made known by Scheele, in 1779, and was formerly prepared as a by-product of the manufacture of lead plaster and soap, being now sometimes called for as Oil of Soap. At present it is made commercially

by distillation, the process consisting in decomposing fats by superheated steam, under high pressure, the stearine of the fats (which is propenyl tristearate) uniting with the elements of water to form glycerin and stearic acid.

Chemically, glycerin is the hydrate of the radical Glyceryl or Propenyl, C_3H_5 , and is classed with the alcohols, being known as Glyceric Alcohol, Propenyl Alcohol, or Glycerol.

Glycerin is extensively used in the arts for various purposes, and in pharmacy ranks next to alcohol as a preservative of medicinal solutions and a solvent for medicinal principles. It is employed in making many fluidextracts, both as a preservative and solvent; it is used as an addition to solid extracts, keeping them soft and pliable, and in making many solutions, syrups, tinctures and like preparations. In medicine it is used to allay inflammation and irritation, both external and internal, and it is a familiar application for chaps, sunburn etc. It should be somewhat diluted before it is applied, because of its affinity for moisture. The dose internally is a teaspoonful or more.

Combined with kaolin or other absorbent it has recently come into extensive use in the form of a cataplasm to allay inflammation by absorption from any inflamed part of the body. See Cataplasma Kaolini.

Glycerin is now considerably used as an extractive and preservative in proprietary medicines instead of alcohol, against which there is a popular prejudice caused by the publication of articles in periodical journals.

extensive use in the form of a cataplasm to allay inflammation by

Nitroglycerin. $C_3H_5(NO_2)_3O_8$. This is made by mixing 1 part of nitric acid with 2 parts of sulphuric acid and adding to the mixture slowly and with constant stirring, keeping the mixture cooled artificially, as low as $80^{\circ}F.$, one-seventh of its weight of glycerin. The mixture is then poured into a large quantity of water and the oily liquid, which settles at the bottom, washed with water containing an alkali.

Uses. In mining operations nitroglycerin is extensively used for blasting, also for "shooting" oil and gas wells. Mixed with some inert absorbing substances, which makes it safer to handle, it is known as Dynamite, which is much used for blasting, and in fireworks etc.

In medicine solution of nitroglycerin or tablets of nitroglycerin are considerably used for nervous disorders, and as a heart stimulant, in very small doses.

Mineral Glycerin.

Under this name a neutral, colorless, odorless oil is made from petrolatum. It is furnished under various proprietary names, such as Glycoleum, Abolene, Glymol etc., and is used for spraying in nebulizers and atomizers, and for mixing with other oils etc., in many

preparations used as dressings and applications. Under the proprietary titles it is usually expensive, but it may be bought in bulk as "Mineral Glycerin" or "Paraffin Oil," at a reasonable price. It is much used by dentists and physicians in treatment of the teeth, throat and nasal cavities, and as an emollient dressing.

GLYCERINOPHOSPHATES OR GLYCEROPHOSPHATES.

These have recently come into use as nerve tonics, and have been very favorably received by the medical profession. They are masses or powders prepared by precipitating with alcohol a solution of glycerinophosphates. They may all be made in the same manner as the following calcium glycerinophosphate:

Calcium Glycerinophosphate.

Put into a suitable flask 100 Gm. of 60 percent. phosphoric acid and 150 Gm. of glycerin. Fix a double perforated cork into the flask, one hole with a thermometer in it, the other as a safety tube as a vent. Then heat with a Bunsen over gauze. The mixture begins to boil at 120°C., and between that and 190° it becomes dark brown and syrupy, and gives off acrolein vapor. The heat is then removed and the mixture allowed to cool, when it becomes viscous. Next the mass is mixed, about 30 Gm. at a time, with a chalk mixture (50 Gm. of precipitated chalk to 250 Cc. of water), the mixture well stirred to promote effervescence, and at the end of 6 hours it is filtered. The filtrate is a solution of calcium glycerinophosphate, which is precipitated by the addition of alcohol. It is collected, dried partially with bibulous paper, and finally over sulphuric acid in a bell-jar.

Other Glycerinophosphates.

For preparing glycerinophosphate of lithium, iron, magnesium, manganese, potassium or sodium, use their carbonates instead of calcium carbonate, as in the above formula. The dose of iron glycerinophosphate is from 1 to 3 grains, and of all the others from 3 to 5 grains.

Solutions of Glycerinophosphates are prepared by dissolving the carbonates of these metals in glycerinophosphoric acid, and glycerinophosphate of quinine, strychnine or other alkaloids may be prepared by dissolving the required alkaloid with a small quantity of diluted glycerinophosphoric acid, concentrating the solution and crystallizing.

Syrups of Glycerinophosphates may be made by first making the solution as above, and adding syrup to produce the required percentage of the salts in the compound; from 1 to 3 grains of the simple or mixed salts being represented in a fl.drachm.

Elixirs of Glycerinophosphates may be prepared by dissolving the various glycerinophosphates in elixir; a fl.drachm representing from 1 to 3 grains of the simple or mixed salts.

Glycerinophosphate Mixtures.

The following formulas make excellent preparations for those suffering from nervous troubles.

Calcium Glycerinophosphate,	1½ drachms
Sodium, Potassium, Magnesium and Iron	
Glycerinophosphates, of each,	½ drachm
Tincture Ignatia,	½ drachm
Pepsin,	45 grains
Diastase,	45 grains
Tincture of Orange,	3 drachms
Syrup of Cherries,	6 ounces

Mix and filter.

Dose, a dessertspoonful to a tablespoonful twice daily at meal time.

For a cachet the following is the formula :

Lime Glycerinophosphate,	5 grains
Magnesia Glycerinophosphate,	1½ grains
Iron Glycerinophosphate,	¾ grain
Powdered Nux Vomica,	½ grain
Pepsin,	2½ grains
Diastase,	½ grain

This mixture is to fill one cachet. A cachet to be taken at meal time, twice daily.

GLYCERITA. U. S. Glycerites.

Glycerites or glycerines are preparations in which glycerin is used as the solvent of the medicinal agents, or the medium by which it is exhibited. Six glycerites are official in the U. S., and nine glycerines in the Br. P. Many more are supplied under various names, as Glycerols etc., by manufacturing chemists. The following are official in the U. S. and Br. P.

GLYCERINUM ACIDI BORICI. Br. Glycerin of Boric Acid.

Boric Acid, in fine powder, 66 ounces av. or 300 Gm.
Glycerin, a sufficient quantity.

"Heat 9 ounces av. (or 450 Gm.) of glycerin in a weighed porcelain dish, to a temperature not exceeding 302°F. (150°C.), and add the boric acid in portions, constantly stirring. When all is dissolved maintain the temperature of the liquid, frequently stirring, and breaking up the film which forms on the surface, until the mixture has been reduced to the weight of 10 ounces av. (or 500 Gm.); then add 10 ounces av. (or 500 Gm.) of glycerin; mix thoroughly. The product should weigh 20 ounces (or 1000 Gm.)." <Br.

This is almost identical with the U. S. Glyceritum Boroglycerin, which see.

GLYCERITUM ACIDI TANNICI. U. S. Glycerite of Tannic Acid.

Tannic Acid,	20 Gm. or 2 ounces
Glycerin,	80 Gm. or 8 ounces
To make	100 Gm. or 10 ounces

"Triturate the tannic acid with the glycerin to a smooth paste, transfer this to a porcelain dish, avoid contact with metallic utensils, and apply the heat of a water-bath until the tannic acid is completely dissolved. Then transfer the solution to a bottle." <U. S.

Average dose.—2 Cc. (30 minims).

Glycerinum Acidi Tannici, Glycerin of Tannic Acid. Br. This is prepared by triturating tannic acid 1 ounce (or 20 Gm.) with glycerin sufficient to make 5 fl.ounces (or 100 Cc.).

GLYCERINUM ALUMINIS. Br. Glycerin of Alum.

Alum, in powder,	1 ounce	or 20 Gm.
Distilled Water,	3 fl.drachms	or 7.5 Cc.
Glycerin, sufficient to make	6 fl.ounces	or 120 Cc.

"Triturate until solution is effected, warming slightly if necessary; set aside; pour off the clear liquid from any deposited matter that may be present." <Br.

GLYCERITUM AMYLI. U. S. Glycerite of Starch.

Starch,	10 Gm. or 1 ounce
Water,	10 Cc. or 1 ounce
Glycerin,	80 Gm. or 8 ounces

"Triturate the starch with the water, until a homogeneous mixture is produced. Then gradually add this to the glycerin, contained in a porcelain dish, and heated to about 140°C. (284°F.). Continue the heat, with constant stirring, keeping it below 144°C. (291.2°F.), until a translucent jelly is formed. Transfer the product to suitable vessels, provided with well-fitting covers." <U. S.

Glycerinum Amyli. Glycerin of Starch. Br.

Starch,	1 ounce	or 20 Gm.
Glycerin,	6½ fl.ounces	or 130 Cc.
Distilled Water,	1½ fl.ounces	or 30 Cc.

"Mix, heat them thoroughly, stirring constantly until a translucent jelly is formed." <Br.

GLYCERINUM BOROGLYCERINI. U. S.

Glycerite of Boroglycerin. Glycerite of Glyceryl Borate.

Solution of Boroglyceride.

Boric Acid, in fine powder,	6½ ounces	or 310 Gm.
Glycerin, a sufficient quantity to make		1000 Gm.

"Heat 460 Gm. (or 9½ ounces) of glycerin in a tared porcelain dish to a temperature not exceeding 150°C. (302°F.), and add the boric

acid in portions, constantly stirring. When all is added and dissolved, continue the heat at the same temperature, frequently stirring, and breaking up the film which forms on the surface. When the mixture has been reduced to the weight of 500 Gm. add to it 500 Gm. of glycerin, mix thoroughly and transfer it to suitable vessels." <U. S.

GLYCERINUM BORACIS. Br. Glycerin of Borax.

Borax,	1 ounce	or	20 Gm.
Glycerin,	6 fl.ounces	or	120 Cc.

"Triturate the borax with the glycerin until solution is effected." <Br.

GLYCERITUM FERRI, QUININÆ ET STRYCHNINÆ PHOSPHATUM. U. S.

Glycerite of the Phosphates of Iron, Quinine and Strychnine.

Soluble Ferric Phosphate,

	80.0 Gm. or	2 oz. av. + 360 grains
Quinine,	104.0 Gm. or	3 oz. av. + 291 grains
Strychnine,	0.8 Gm. or	12 $\frac{2}{3}$ grains
Phosphoric Acid,	200.0 Cc. or	6 $\frac{3}{4}$ fl.ounces
Glycerin,	500.0 Cc. or	16 fl.oz. + 453 minims
Water, q. s. to make	1000 Cc. or	33 fl.oz. + 390 minims

"Heat the soluble ferric phosphate with 200 Cc. (or 6 $\frac{1}{4}$ fl.ounces) of water in a porcelain dish, at a temperature not exceeding 70°C. (158°F.), until it is dissolved. Then add the phosphoric acid, with the quinine and the strychnine and sufficient water to make the measure 500 Cc., and stir until solution is effected. Mix the solution with the glycerin and filter if necessary." <U. S.

Average dose.—1 Cc. (15 minims).

GLYCERITUM HYDRASTIS. U. S. Glycerite of Hydrastis.

Hydrastis, in No. 60 powder,	1000 Gm.
Glycerin,	500 Cc.
Alcohol,	

Water, each, a sufficient quantity to make	1000 Cc.
--	----------

"Moisten the hydrastis with 350 Cc. of alcohol, pack it firmly in a cylindrical percolator; then add enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 48 hours. Then allow the percolation to proceed slowly, gradually adding alcohol until the hydrastis is practically exhausted. Remove nearly all the alcohol by distillation or evaporation, pour the thick concentrated liquid into 500 Cc. of ice-cold water, and set it aside in a cold place, for 24 hours. Then filter, pass

enough water through the filter to make the filtrate measure 500 Cc., add the glycerin and mix thoroughly." <U. S.

Average dose.—2 Cc. (30 minims).

This is intended to make a preparation similar to the proprietary Fluid Hydrastis which has been very popular.

GLYCERITUM PHENOLIS. U. S. Glycerite of Phenol.

Liquefied Phenol,	20 Cc. or 2 fl.ounces
Glycerin,	80 Cc. or 8 fl.ounces
To make	100 Cc. or 10 fl.ounces

"Add the liquefied phenol to the glycerin and stir until thoroughly mixed." <U. S.

Average dose.—0.3 Cc. (5 minims).

Glycerinum Acidi Carbolici. Br. Glycerin of Phenol.

Phenol,	1 ounce or 20 Gm.
Glycerin, sufficient to produce	5 ounces or 100 Cc.

"Triturate the phenol with the glycerin until solution is effected." <Br.

GLYCERINUM PEPSINI. Br. Glycerin of Pepsin.

Pepsin,	800 grains or 80 Gm.
Hydrochloric Acid,	110 minims or 10 Cc.
Glycerin,	12 fl.ounces or 525 Cc.

Distilled Water, a sufficient quantity.

"Mix the hydrochloric acid, glycerin, and 6 fl.ounces (or 260 Cc.) of the distilled water; then add the pepsin; after one week pour off the clear liquid to produce 20 fl.ounces (or 875 Cc.)" <Br.

A fl.drachm represents 5 grains of pepsin. This may be generally used when Liquor Pepsin is prescribed.

GLYCERINUM PLUMBI SUBACETATIS. Br.

Glycerin of Lead Subacetate.

Lead Acetate,	5 ounces or 100 Gm.
Lead Oxide, in powder,	3½ ounces or 70 Gm.
Glycerin,	20 fl.ounces or 400 Cc.
Distilled Water,	12 fl.ounces or 240 Cc.

"Mix, boil for a quarter of an hour; filter; evaporate at a temperature not exceeding 222°F. (105.5°C.), until the product weighs 32¾ ounces (or 655 Gm.), and has a sp. gr. of 1.48." <Br.

GLYCERINUM TRAGACANTHÆ. Br.

Glycerin of Tragacanth.

Tragacanth, in powder,	½ ounce or 10 Gm.
Glycerin,	1½ fl.ounces or 30 Cc.
Distilled Water,	½ fl.ounce or 10 Cc.

"Mix the glycerin with the tragacanth; add the distilled water; triturate until a homogeneous paste is produced." < Br.

GLYCERITUM VITELLI. Glycerite of Yolk of Egg.

Glyconin.

Fresh Yolk of Egg,	45 Gm. or 4½ ounces
Glycerin,	55 Gm. or 5½ fl.ounces

Rub the yolk of egg in a mortar with the glycerin, gradually added, until they are thoroughly mixed. Then transfer the mixture to a bottle. This was official in the U. S. P., 7th revision, but has been dismissed.

Other Glycerites, not Official.

The following glycerites are not official in any pharmacopœia, but some of them are considerably used. They are called **glyceroles** by manufacturers.

Glycerite of Arnica. Fluidextract of arnica 2 fl.ounces, glycerin 6 fl.ounces, alcohol 4 fl.ounces, water 4 fl.ounces. Mix the fluidextract, alcohol and water and filter the mixture clear, then add the glycerin.

Glycerite of Bismuth. Tris-nitrate of bismuth 1 ounce av., glycerin 4 fl.ounces. Dissolve the nitrate of bismuth in the glycerin, without heat. It is the crystallized nitrate of bismuth, not the subnitrate, which is directed in this formula.

Glycerite of Calendula. Calendula (marigold flowers) 3 ounces av., glycerin 8 fl.ounces, water, sufficient to make 1 pint. Mix the glycerin with 8 ounces of water, moisten the flowers with the mixture and make a tincture by water-bath percolation, adding water to the drug to make a pint of the percolate.

Glycerite of Carbolate of Iodine. Carbolic acid 1 ounce av., iodine 1 ounce av., alcohol 4 fl.ounces, water 5 fl.ounces, glycerin 5 fl.ounces. Dissolve the carbolic acid in the glycerin and add the water, dissolve the iodine in the alcohol and mix the solutions.

Glycerite of Iodine. Colorless Tincture or Solution of Iodine. Tincture of iodine 8 fl.ounces, glycerin 8 fl.ounces, sodium hyposulphite 1 ounce av. Rub the sodium salt to a fine powder and then with the glycerin until dissolved, and add the tincture to the solution, allow to stand, filter or decant. This is a glycerite of sodium iodide, but it is more familiarly known as Colorless Tincture of Iodine.

Glycerite of Tar. Tar, (pine or birch), 1 ounce av., magnesium carbonate 1 ounce av., glycerin 8 fl.ounces, alcohol 3 fl.ounces, water 8 fl.ounces. Rub the magnesium carbonate to a fine powder and incorporate the tar with it. Mix the glycerin, alcohol and water and rub with the mixture in a mortar, then put in a quart jar, allow to stand a few days, and decant and filter the clear portion. This is given for coughs in doses of a teaspoonful to a dessertspoonful.

Glycerite of Tar Compound. Fluidextract of wild cherry $\frac{1}{2}$ fl.ounce, fluidextract of squill 80 minims, glycerite of tar 1 pint. Mix them and filter if necessary. The dose is a teaspoonful or more for coughs etc.

Glycerite of Yerba Santa Compound. Fluidextract of yerba santa 2 fl.ounces, fluidextract of grindelia 1 fl.ounce, fluidextract of wild cherry 1 fl.ounce, fluidextract of liquorice 1 fl.ounce, potassium bromide 160 grains, salicylic acid 80 grains, tar 80 grains, glycerin 8 fl.ounces, water 4 fl.ounces, magnesium carbonate 1 ounce av. Mix the fluidextracts and tar and rub with the magnesium carbonate in a mortar, mix the glycerin and water and rub with the mixture in the mortar, filter and dissolve the potassium bromide and salicylic acid in the filtrate. The dose is a teaspoonful or more for cough, asthma etc.

GLYCYRRHIZINUM AMMONIATUM. U. S.

Ammoniated Glycyrrhiza.

Glycyrrhiza, in No. 20 powder, 500 Gm. or $16\frac{2}{3}$ ounces
Water, Ammonia Water, Sulphuric Acid,
Each, a sufficient quantity.

Water 475 Cc. (or 7.6 fl.ounces) is mixed with 25 Cc. (or 0.4 fl.ounces) of ammonia water, and the drug moistened. Macerate 24 hours. Then pack in a conical glass percolator, and gradually pour water upon it until 500 Cc. (or 16 fl.ounces) of percolate are obtained. To this add sulphuric acid, slowly, and with constant stirring, so long as a precipitate is produced. Collect this on a strainer and wash it with cold water until the washings no longer have an acid reaction, then redissolve it in water with the aid of sufficient ammonia water; filter if necessary, add sulphuric acid again so long as a precipitate is produced. Collect, wash again with cold water, dissolve it in just a sufficient quantity of ammonia water diluted with an equal volume of water, and spread the solution upon plates of glass so that, when dry, the product may be obtained in scales.

GOSSYPIUM PURIFICATUM. U. S. Purified Cotton.

Gossypium. Br. Cotton. Cotton Wool.

"The hairs of the seed of *Gossypium herbaceum*, Linné (Fam. Malvaceæ), and of other species of *Gossypium*, freed from the adhering impurities, and deprived of fatty matter." <U. S.

"The hairs of the seed of *Gossypium barbadense*, Linn., and of other species of *Gossypium*, freed from fatty matter." <Br.

Cotton is used in pharmacy as a plug for filtering many liquids and has also been employed as a medium in making aromatic waters. In surgery absorbent cottons are extensively used in dressing sores, wounds etc.

Absorbent Cotton. The published method of purifying cotton is to first boil selected cotton in a 5 percent. solution of caustic potassa or

soda for half an hour, then press out and wash carefully to remove nearly all the alkali, then press out the water and put the cotton in a 5 percent. solution of chlorinated lime for 15 or 20 minutes, then wash again with water and dip in water slightly acidulated with hydrochloric acid, then wash again, and again boil for 15 or 20 minutes in a 5 percent. solution of caustic potassa or soda; again wash and dip in acidulated water and finally wash thoroughly with pure water, press and dry quickly. It may be questioned if the process, unless carefully conducted, would produce an article purer or better than the fine quality of untreated cotton that may be found in the market; and, in our opinion, that is generally about what druggists get when they buy absorbent cotton.

Medicated Cottons. These are prepared by sprinkling medicinal solutions upon cotton until it is uniformly saturated with the medicament, then drying and keeping in closed vessels, or tight packages. The general method of preparing them is as follows:

Spread out the cotton in a thin sheet and sprinkle it uniformly with the liquids, then pack in a closed vessel for a day or two until the solution has become equally distributed throughout the cotton, and dry at a moderate temperature until the moisture has disappeared, and pack away in a closed package.

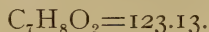
In making these cottons, some require alcohol as a solvent of the medicinal ingredient, and some ether; these may be recovered by drying the cotton in a drying chamber connected with a condenser. For making some of them petroleum ether (gasoline) may be used, which, as it is inexpensive, very much lessens the cost.

Fenner's water-bath percolator and still may be used to recover the ether or alcohol used. The saturated cotton may be put in the percolator and heat applied by the water-bath to any degree required. The vapor rises and is condensed by the still.

The formulas for making solutions used for medicated cottons are similar to those for making medicated gauzes, which see. They are seldom prepared, except by manufacturing chemists who have suitable conveniences for their production.

GUAIACOL. U. S.

Methyl-pyro-catechin. Monomethyl-catechin.



"One of the chief constituents [$C_6H_4(OH)(OCH_3)_{1:2}$] of creosote, the product from beechwood-tar, obtained by collecting and purifying the fraction of creosote boiling between 200° and 205° Cc. (392° and 401° F.); or prepared synthetically from either catechol by methylating, or from ortho-anisidin by diazotizing and boiling. Guaiacol should be preserved in amber-colored bottles, protected from light."
<U. S.

This is a liquid compound obtained commercially by fractional distillation of beechwood-tar creosote, passing over between 200° and 205°C., and purifying. It is also obtained by the dry distillation of guaiacum from which it derives its name. It is allied to creosote; is soluble in water, 1 to 85, and readily soluble in alcohol and ether. It forms crystalline salts with the metals, but these compounds are not very stable. It is properly a substitute for creosote and should be given in the same doses and for the same conditions as creosote is employed. It is particularly recommended in the treatment of tuberculosis. The dose is 2 to 15 minims, in glycerin.

Average dose.—0.5 Gm. (8 minims).

GUAIACOLIS CARBONAS. U. S. Guaiacol Carbonate. [Duotal].



"A guaiacol derivative $[(C_6H_4(OCH_3O)_2 \cdot CO]$, obtained by the action of carbonyl chloride upon sodium-guaiacolate." < U. S.

This is a white, crystalline powder, produced by a complicated process. It is insoluble in water but soluble in 48 parts of alcohol, 1.5 parts of chloroform and 13 parts of ether at 25°C. (77°F.).

Uses. It is employed as an antiseptic, and in the treatment of tuberculosis.

Average dose.—1 Gm. (15 grains).

Other Guaiacol Salts.

The following unofficial salts of guaiacol are somewhat employed in medicine:

Guaiacol Biniodide. A reddish-brown powder prepared by the interaction of guaiacol and iodine. Soluble in alcohol and fixed oils, insoluble in water. It is recommended as a remedy for tuberculosis.

Guaiacol Phosphite. Guaiacophosphal. White crystals, insoluble in water, made by the interaction of guaiacol with phosphorous acid. Uses and doses the same as guaiacol.

Guaiacol Salicylate. Guaiacol Salol. A white, insoluble powder used as an anti-tubercular and intestinal antiseptic. Dose, 10 to 15 grains.

Styracol is a compound of guaiacol with cinnamyl chloride. It is used in catarrhal conditions and in gonorrhœa, also as a substitute for guaiacol in the treatment of phthisis.

Guaiacol Valerate. Geosote. A yellow, oily liquid, prepared by the combination of guaiacol with valeric acid. Used in tuberculosis. Dose, 3 to 10 minims.

GUARANA. U. S. Guarana.

"A dried paste consisting chiefly of the crushed seeds of *Paullinia Cupana*, Knuth (*Paullinia sorbilis*, Martius) (Fam. Sapindaceæ);

yielding, when assayed by the process given, not less than 3.5 percent. of its alkaloidal principles." < U. S.

Average dose.—2 Gm. (30 grains).

The woody climber from the fruit of which this paste is made grows in Brazil. The paste is prepared by the native Indians of the country in which the plant is found. The seeds are first shelled and well washed, and then roasted for 5 or 6 hours. Their external shells are then removed by beating them in a sack with clubs, and the coarse powder of the interior is mashed in a mortar with a little water to a pasty mass which is kneaded and shaped into cylindrical masses like a small link of sausage. These are then dried in the sun or by a slow fire. Powdered guarana is used as a ingredient in headache powders, and the fluidextract is official in the U. S. P. The dose is 30 to 90 minims.

Guaranine. The chief medical constituent of guarana is claimed to be identical with caffeine and thein, and 5 percent. is obtained from an average quality of guarana. It may be prepared by mixing 1 part of calcined magnesia with 5 parts of powdered guarana, moistening with water and after standing 24 hours, percolating in a water-bath percolator with hot chloroform until the drug is exhausted, then distilling off the chloroform, boiling the residue in water, filtering the decoction and evaporating it over sulphuric acid and crystallizing. This is used for the same purposes as caffeine.

HEDONAL.

This is, chemically, methylpropylcarbinol-urethane. A white powder, little soluble in water but readily soluble in alcohol. It is prescribed as a mild hypnotic. Dose 15 to 30 grains.

HEMA- HEMI- HEMO-.

These combining words all relate to blood or its constituent principles, united in some form with other substances. A great number of these combinations are listed by manufacturing chemists.

Hematin-albumin. A ferruginous albumin preparation consisting of dried blood-fibrin. It is a fine brownish-red powder, and is used as a hematinic. Dose 1 or 2 teaspoonfuls in milk or water.

Hemogallol. This is hemoglobin deoxidized by pyrogallol. A brown, insoluble powder used as a hematinic. Dose 4 to 8 grains.

Hemoglobin. This is the red coloring matter of blood. It is a brownish-red powder or scales, soluble in water, and is employed as a hematinic. Dose 5 to 30 grains.

Hemol. This is hemoglobin, deoxidized by zinc. It is a dark-brown insoluble powder, recommended as a blood-builder. Dose 2 to 8 grains. Several compounds of hemol are listed by manufacturers and offered under proprietary names.

Hemol, Arsenated, known as arsenhemol.

Hemol Bromide, known as bromohemol.

Hemol Cuprated, known as cuprohemol.

Hemol Iodized, known as iodochemol.

HERBÆ — HERBS.

The name "herbs" is given to small plants which are gathered when in flower and either the whole plant or the flowering tops used. A great number of plants are designated as herbs in foreign pharmacopœias, but in the U. S. and Br. P. they are only known by the name of the plant.

As all which are official in the U. S. and Br. are noted in the alphabetical order of subjects and most others are mentioned somewhere in this work, no further reference will be made to them under this heading.

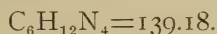
HEROIN. Diacetal-Morphine.

This new compound is produced by heating morphine with an excess of acetal, evaporating and crystallizing. It has come into rapid prominence as an antispasmodic and sedative, particularly for coughs. It is a white, bitter powder, insoluble in water, but freely soluble in alcohol. The dose is $\frac{1}{24}$ to $\frac{1}{12}$ grain.

Heroin Hydrochloride. This may be prepared by treating heroin with dilute hydrochloric acid, evaporating the solution and crystallizing. This salt of diacetalmorphine is preferred because of its greater solubility—soluble in 2 parts of water. The dose is the same as above.

Pure Food and Drugs Law. This law requires that all preparations or compounds intended for Interstate Commerce shall state upon the label the quantity of Heroin contained per ounce, in grains or grammes.

HEXAMETHYLENAMINA. U. S. Hexamethylenamine.



"A condensation product [Hexamethylene-tetramine, $(\text{CH}_2)_6\text{N}_4$], obtained by the action of ammonia upon formaldehyde. It should be kept in well-stoppered bottles." <U. S.

This was formerly known as Urotropinum or Formium, under which names it has been considerably employed as a solvent for uric acid. It is in colorless, lustrous crystals, soluble in about 1.5 parts of water, and 10 parts of alcohol at 25°C . (77°F .).

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

Formin. This is a brand name for hexamethylenamine, by which it is known commercially and this name is commonly applied to the solid formaldehyde above described.

This is also known by several trade names; as Aminoform, Cistamine, Cystogen, Hexamine, Uritone, Urotropin etc.

Hetralin. This is, chemically, dioxybenzene-hexamethylenetetramine, and is composed of 56 parts of hexamethylenamine, with 44 parts resorcin. It is a white, odorless powder, soluble in 20 parts of water, and is recommended as a powerful urinary disinfectant. It yields resorcin and formaldehyde when decomposed in the body. Dose 8 to 15 grains.

Helmitol. Urapurgol. This is, chemically, hexamethylenetetramine anhydromethylencitrate. It is in small colorless crystals or white powder having an agreeable acidulous taste, soluble in about 10 parts of water. It is used as a urinary acidifier and disinfectant in bladder troubles. It is identical with new urotropin.

HOLOCAINE HYDROCHLORIDE.

This is, chemically, phenetidylacet-phenetidin hydrochloride. A white, bitter powder, soluble in 50 parts of water and readily soluble in alcohol. It is employed as a local anesthetic, like cocaine, and is chiefly used in solution, 1 percent., for eye and ear operations.

HOMATROPINÆ HYDROBROMIDUM. U. S., Br.**Homatropine Hydrobromide.**

"The hydrobromide [$\text{HBr} \cdot \text{C}_{16}\text{H}_{21}\text{NO}_3$] of an alkaloid obtained by condensation of tropine and mandelic acid. It should be kept in well-stoppered vials, protected from light." <U. S.

"The hydrobromide of an alkaloid prepared from tropine." <Br.

This is a crystalline powder, colorless and without odor, with a bitter taste, very soluble in water. It may be prepared by neutralizing diluted hydrobromic acid with homatropine, concentrating and crystallizing.

Its properties are similar to those of the salts of atropine. It is used chiefly as a mydriatic, being less irritant than atropine. A 2% solution is usually employed.

Average dose.—0.0005 Gm.=0.5 milligramme ($\frac{1}{128}$ grain).

Homatropine hydrochloride, homatropine salicylate, homatropine sulphate and other salts of homatropine may be made in the same manner as the foregoing by neutralizing the diluted acid with homatropine, evaporating and crystallizing.

HYDRARGYRUM. U. S., Br. Mercury.

Symbol Hg; Atomic weight 198.50; Sp. gr. 13.56 at N. T.

"It should contain not less than 99.9 percent. of pure metallic mercury, and should be kept in strong, well-stoppered bottles." <U. S.

"A metal obtained from native mercuric sulphide." <Br.

Mercury, or Quicksilver, is a fluid metal, found chiefly associated with sulphur in the form of ore, called Cinnabar, in California and other parts of the world. It is obtained by roasting the ore in kilns through which flames are made to pass, which ignite the sulphur and vaporize the mercury, which is subsequently condensed. It congeals into a solid at -40°F .

Mercury has been known and used since the earliest history of medicine, wonderful virtues being ascribed to it by the earlier writers and practitioners. It is extensively used in mining operations to separate silver and gold from crushed quartz, sand etc., which it does by forming an amalgam with them. It is employed for making thermometers, barometers and other philosophical instruments, and with tin foil, making an amalgam for glass mirrors etc. Its salts are extensively employed in the arts, in chemistry, pharmacy and medicine. It

combines with most acids, forming two classes of salts, Mercurous and Mercuric.

Mercury and its salts are further described in the Chemical Section, Part I.

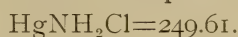
Uses. Mercury is used in pharmacy chiefly for making mercurial ointment, mercury with chalk and salts of mercury.

The following are the combinations and salts of mercury official in the U. S. P. and Br. P.:

HYDRARGYRUM AMMONIATUM. U. S., Br.

Ammoniated Mercury. Mercuric Ammonium Chloride.

White Precipitate.



"It should contain not less than 78 percent., nor more than 80 percent. of metallic mercury." < U. S.

Corrosive Mercuric Chloride, in powder, 100 Gm. or 1 ounce
Ammonia Water,

Distilled Water, of each, a sufficient quantity.

The corrosive mercuric chloride is to be dissolved in 2000 Cc. (or 20 ounces) of warm distilled water and the solution filtered. When cold the filtered liquid is to be poured gradually and with constant stirring into 150 Cc. (or 1½ ounces) of ammonia water, taking care that the latter shall remain in slight excess. The precipitate which forms is to be collected on a filter and washed with a mixture of 400 Cc. (or 4 ounces) of distilled water, with 20 Cc. (or 2 fl.drachms) of ammonia water, and finally dried between sheets of bibulous paper in a dark place at a temperature not exceeding 30°C. (86°F.). < U. S.

The Br. formula is

Mercuric Chloride, 60 Gm. or 3 ounces

Solution of Ammonia, 80 Cc. or 4 fl.ounces

Distilled Water, a sufficient quantity.

The mercuric chloride is to be dissolved in 60 ounces (or 1200 Cc.) of distilled water, with the aid of heat; this solution is then to be poured into the solution of ammonia diluted with 20 ounces (or 400 Cc.) of distilled water, stirring constantly. The precipitate is to be collected on a filter and well washed with distilled water, then dried at a temperature not exceeding 212°F. (100°C.).

Uses. This is used chiefly for making ointment.

HYDRARGYRUM CUM CRETA. U. S., Br.

Mercury with Chalk.

Mercury, 38 Gm. or 1 ounce av. + 148 grains

Prepared Chalk, 57 Gm. or 2 ounces av. + 45 grains

Clarified Honey, 10 Gm. or 154 grains

Water, a sufficient quantity.

The mercury and honey are to be weighed into a strong bottle of 100 Cc. (or 4 ounces) capacity, and 2 Cc. (or $\frac{1}{2}$ fl.drachm) of water added. The bottle is to be firmly corked and shaken for about half an hour at a time, until it has had 10 hours shaking, or until the globules of mercury are no longer visible under a lens magnifying 4 diameters. The prepared chalk is to be rubbed in a mortar with water to a cream paste and the contents of the bottle added, washing out the bottle with a little water and adding, and triturating the contents of the mortar to a uniform mixture. The mixture is then to be dried, first by putting between folds of bibulous paper and then in a capsule, to 100 Gm. (or 3 ounces av.+231 grains=nearly $3\frac{1}{2}$ ounces av.). It is then to be reduced to a uniform powder without trituration. <U. S.

The Br. P. directs:

Mercury,	20 Gm. or 1 ounce
Prepared Chalk,	40 Gm. or 2 ounces

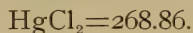
Rub the mercury and prepared chalk in a porcelain mortar until metallic globules cease to be visible to the naked eye, and the mixture acquires a uniform gray color.

Uses. This is a mild form of mercury considerably used for children. The dose is from 3 to 10 grains. Mercury and magnesia made in the same proportions and manner is used for the same purpose.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

HYDRARGYRI CHLORIDUM CORROSIVUM. U. S.

Corrosive Mercuric Chloride. Corrosive Sublimate.



"It should contain not less than 99.5 percent. of pure Mercuric Chloride, and should be kept in well-stoppered bottles." <U. S.

The present U. S. P. does not give the formula nor process for making this salt.

Hydrargyri Perchloridum. Br. Mercuric Chloride. Syn. Bichloride of Mercury. Corrosive Sublimate. Perchloride of Mercury. The Br. P. describes it as: "A salt, HgCl_2 , obtained as a sublimate by heating a mixture of mercuric sulphate, sodium chloride and a little black oxide of manganese." <Br.

The Br. P. 1885, directed this to be prepared by mixing 20 ounces persulphate of mercury with 16 ounces of sodium chloride and 1 ounce of black oxide of manganese, and heating them together in an apparatus adapted for sublimation, by which the vapors which rise are condensed.

This salt is soluble at N. T. in 15 parts of water, or in 3 parts of alcohol, or about 14 parts of glycerin.

Uses. This salt is used for making several other preparations of mercury and in medicine as a mercuric alterative in doses of $\frac{1}{16}$ to

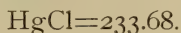
$\frac{1}{8}$ grain. It is extensively employed in weak solution to destroy zymotic germs, and by surgeons as a germicide to prevent poisoning during operations.

Average dose.—0.003 Gm.=3 milligrammes ($\frac{1}{20}$ grain).

Antidote. The best antidote for poisoning with corrosive sublimate is albumen (white of egg), with which it forms an insoluble compound.

HYDRARGYRI CHLORIDUM MITE. U. S.

Calomel. Mild Mercurous Chloride.



"It should contain not less than 99.5 percent. of pure Mercuric Chloride, and be kept in well-stoppered bottles." <U. S.

No formula nor process for making this salt is given in the present U. S. P.

Hydrargyri Subchloridum. Br. **Mercurous Chloride.** Syn. Calomel. Hydrargyri Chloridum. Subchloride of Mercury.

"A salt, Hg_2Cl_2 , obtained as a sublimate when a mixture of mercurous sulphate and sodium chloride is heated." <Br.

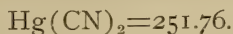
The Br. P. 1885 directs: Persulphate of mercury 10 ounces, mercury 7 ounces, sodium chloride 5 ounces, boiling distilled water a sufficiency. The persulphate of mercury is to be moistened with some of the water and rubbed with the mercury until globules are no longer visible. The sodium chloride is then to be added and thoroughly mixed by trituration. The mixture is then to be sublimed in a suitable apparatus of such size that the calomel shall fall in a fine powder on the floor instead of adhering to the sides of the vessel. The powder is then to be washed with boiling distilled water, and dried at a temperature not exceeding boiling water.

Calomel is insoluble in water, ether, alcohol, and other ordinary mediums.

Uses. Calomel is used in making several other preparations of mercury, and is the favorite mercurial salt for internal administration as an alterative or purgative. The dose is $\frac{1}{2}$ to 5 grains or more.

Average dose.—Laxative, 0.125 Gm.=125 milligrammes (2 grains). Alterative, 0.965 Gm.=65 milligrammes (1 grain).

HYDRARGYRI CYANIDUM. Cyanide of Mercury.



This was official in the U. S. P. 7th revision, but was dismissed in the 8th. The following formula was formerly official:

Dissolve 5 tr.ounces of ferrocyanide of potassium in 20 fl.ounces of water and add the solution to $4\frac{1}{4}$ tr.ounces of sulphuric acid, diluted with 10 fl.ounces of water and contained in a glass retort. Distil the mixture nearly to dryness, conducting the vapor into a receiver con-

taining 10 fl.ounces of water and 3 tr.ounces of red oxide of mercury. Set aside 2 fl.ounces of the distilled liquid and to the remainder, add with agitation, sufficient red oxide to destroy the odor of hydrocyanic acid, then filter the solution, and having added the reserved liquid evaporate the whole in a dark place, in order that crystals may form, which should be kept in well-stoppered bottles protected from light.

Soluble at N. T. in 12.8 parts of water and in 15 parts of alcohol.

Uses. This salt is used as an alterative in syphilis, in doses of $\frac{1}{16}$ to $\frac{1}{8}$ grain.

HYDRARGYRI IODIDUM FLAVUM. U. S.

Yellow Mercurous Iodide. Green Iodide of Mercury. Protiodide of Mercury.

$\text{HgI}=324.40.$

"It should contain not less than 99.5 percent. of pure Mercurous Iodide." < U. S.

Mercury,

50 Gm. or 5 ounces

Nitric Acid,

Potassium Iodide,

Distilled Water, each, a sufficient quantity.

"Mix 20 Cc. (or 2 fl.ounces) each, of nitric acid and distilled water, and when the liquid is cold, pour it upon the mercury contained in a glass beaker. Set the mixture aside in a dark place, and keep it at a temperature between 25° and 30°C. (77° and 86°F.), with occasional agitation, until the reaction ceases and a little mercury still remains undissolved. Separate the crystals of mercurous nitrate which will have formed, from the mother-liquor, allow them to drain in a glass funnel and dry them on bibulous paper, in a dark place. When the salt is dry, dissolve 40 Gm. (or 4 ounces) of it in 650 Cc. (or 65 ounces) of distilled water to which 6 Cc. (or 288 minims) of nitric acid have previously been added. Having prepared a solution of 16 Gm. (or 1 ounce+264 grains) of potassium iodide in 32 Cc. (or 3¼ ounces) of distilled water, slowly pour the solution of potassium iodide into the solution of mercurous nitrate, with constant stirring, which should be continued for 15 minutes, allow the precipitate to subside, decant the supernatant liquid, and wash the precipitate with ten successive portions of 500 Cc. (or 50 ounces) each of distilled water. Finally transfer the precipitate to a filter, and dry it between sheets of bibulous paper, in a dark place, at a temperature not exceeding 40°C. (104°F.), and keep it in dark, amber-colored bottles."

"Instead of weighing off 40 Gm. of the mercurous nitrate, as above directed, the whole of the crystallized salt may be taken and the amount of potassium iodide etc., adjusted to the proportions given above." < U. S.

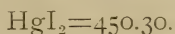
Average dose.—0.010 Gm.=10 milligrammes ($\frac{1}{5}$ grain).

Uses. This salt is used as an alterative and absorbent; being milder than red iodide, it is better adapted for internal use.

HYDRARGYRI IODIDUM RUBRUM. U. S., Br.

Red Mercuric Iodide. Red Iodide of Mercury.

Mercuric Iodide. Br. Biniodide of Mercury.



"It should contain not less than 99.5 percent. of pure Mercuric Iodide." < U. S.

"Precipitated Mercuric Iodide, HgI_2 , formed by the interaction of mercuric chloride and potassium iodide." < Br.

The U. S. P. formula is:

Corrosive Mercuric Chloride,	40 Gm. or 4 ounces
Potassium Iodide,	50 Gm. or 5 ounces
Distilled Water, a sufficient quantity.	

"Dissolve the corrosive mercuric chloride and the potassium iodide, each, in 800 Cc. (or 8 ounces) of distilled water, and filter the solutions separately. Pour both solutions, simultaneously, and in a thin stream, with constant and very active stirring, into 2000 Cc. (or 200 ounces) of distilled water. When the precipitate has subsided, decant the supernatant liquid, collect the precipitate on a filter, and wash it with cold distilled water, until the washings give not more than a faint opalescence with silver nitrate test solution. Finally, dry it in a dark place, between sheets of bibulous paper, at a temperature not exceeding 40°C . (104°F .), and keep it in well-stoppered bottles, protected from light." < U. S.

Average dose.—0.003 Gm.=3 milligrammes ($\frac{1}{20}$ grain).

Uses. This salt is given in doses of $\frac{1}{32}$ to $\frac{1}{8}$ of a grain for syphilis etc., and is used in making ointments and other absorbent applications.

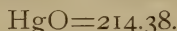
HYDRARGYRI OLEAS. Br. Mercuric Oleate.

"Precipitated Mercuric Oleate, formed by the interaction of mercuric chloride and sodium oleate." < Br.

Mercuric Chloride,	1 ounce	or 32 Gm.
Hard Soap, powdered,	2 ounces	or 64 Gm.
Oleic Acid,	1 fl.drachm	or 4 Cc.
Distilled Water, boiling, a sufficient quantity.		

"Dissolve the mercuric chloride in 10 fl.ounces (or 320 Cc.) of the distilled water. Triturate the oleic acid with the hard soap, and dissolve the product in 11 fl.ounces (or 352 Cc.) of the distilled water. Mix the solutions; boil for 10 minutes; set aside for the mercuric oleate to deposit; decant the supernatant liquid; wash the precipitated oleate with hot distilled water until the decanted liquid affords little or no reaction for chloride, and then dry it on a water-bath." < Br.

See also Oleatum Hydrargyri. U. S.

HYDRARGYRI OXIDUM FLAVUM. U. S., Br.**Yellow Mercuric Oxide. Yellow Oxide of Mercury.**

"It should contain not less than 99.5 percent. of pure Yellow Mercuric Oxide." <U. S.

"Precipitated Mercuric Oxide, HgO , obtained by the interaction of mercuric chloride and sodium hydroxide." <Br.

The U. S. P. formula is:

Corrosive Mercuric Chloride, 100 Gm. or 10 ounces

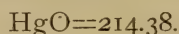
Sodium Hydroxide, 40 Gm. or 4 ounces

Distilled Water, a sufficient quantity.

"Dissolve the corrosive mercuric chloride in 1000 Cc. (or 100 ounces) of warm distilled water, and filter the solution. Dissolve the sodium hydroxide, (which should contain at least 90 percent. of pure anhydrous sodium hydroxide) in 1000 Cc. (or 100 ounces) of cold distilled water, and into this solution pour gradually, and with constant stirring, the solution of corrosive mercuric chloride. Allow the mixture to stand for an hour at a temperature of about 30°C . (86°F .), stirring frequently. Then decant the supernatant, clear liquid from the precipitate, and wash the latter repeatedly by the addition and decantation of portions of distilled water, using 1000 Cc. (or 100 ounces) of water each time. Collect the precipitate on a strainer and continue the washings with warm distilled water, until a small portion of the washings, when poured on a little mercuric chloride test solution, no longer produces a yellowish turbidity at the line of contact of the two liquids. Then allow the precipitate to drain, and dry it between sheets of bibulous paper, in a dark place, at a temperature not exceeding 30°C . (86°F .), and keep it in well-stoppered bottles, protected from light." <U. S.

Almost insoluble in water, insoluble in alcohol, but soluble in dilute nitric or hydrochloric acid, forming colorless solutions.

Uses. In pharmacy this salt is used for making oleate of mercury, and in making ointments etc. It is not administered internally.

HYDRARGYRI OXIDUM RUBRUM. U. S., Br.**Red Mercuric Oxide. Red Oxide of Mercury. Red Precipitate.**

"It should contain not less than 99.5 percent. of pure Red Mercuric Oxide, and should be kept in well-stoppered bottles, protected from light." <U. S.

Although this salt is chemically the same as the preceding one, it presents an entirely different appearance. The present U. S. P. gives no formula for preparing it.

"Red Mercuric Oxide, HgO , is obtained by heating mercurous nitrate until vapors cease to be evolved." <Br.

The Br. P. 1885, gave the following formula for preparing it:

Mercury, by weight,	8 ounces av.
Nitric Acid,	4½ fl.ounces
Water,	2 fl.ounces

Dissolve half the mercury in the nitric acid, diluted with water, evaporate the solution to dryness and with the dry salt thus obtained triturate the remainder of the mercury until the two are uniformly blended together. Heat the mixture in a porcelain dish, with repeated stirring, until acid vapors cease to be evolved.

Almost insoluble in water, insoluble in alcohol; but soluble in dilute nitric or hydrochloric acid, forming colorless solutions.

Uses. Red precipitate, as it is most familiarly known, is used in pharmacy for preparing an ointment, and for other purposes. It is a favorite domestic application, in the form of ointment, for itch, body-vermin etc. It is not used internally.

Other Mercury Combinations.

The foregoing official combinations of mercury embrace most that are used to any extent in pharmacy. Some other salts are sometimes used and are noticed under Mercury, in the Chemical Section, Part I.

HYDRASTINA. U. S. Hydrastine.



"An alkaloid obtained from Hydrastis. It should be kept in well-stoppered bottles." < U. S.

This may be prepared in the following manner:

Hydrastis, (Golden Seal),	2 pounds av.
Alcohol,	12 pints

Moisten the powder with 4 pints of alcohol and allow to macerate during 24 hours, then transfer to a water-bath percolator, pour enough alcohol upon it to cover the drug and heat moderately for 1 hour, then begin to percolate, adding alcohol to the drug through the percolator and continuing the heat and percolation until all the alcohol has been used. Add to the percolate just enough sulphuric acid to give an acid reaction, and after 4 hours, separate the crystals of berberine which have formed, by filtration. To the filtered liquid add sufficient ammonia water to incompletely neutralize, and, after standing, filter to remove the crystals of ammonium sulphate; then distil the greater part of the alcohol, add the residue to 10 times its volume of cold water and after standing 24 hours, filter to separate the resinous and fatty matter. The filtered liquid is an impure solution of hydrastine sulphate. Precipitate this solution with an excess of ammonia water and collect and drain the precipitate. Add to this precipitate 10 times its weight of water acidulated with sulphuric acid, and after standing 24 hours, precipitate again with ammonia water. Dissolve this precipitate in boiling alcohol and, upon cooling, yellow

crystals of impure hydrastine will be deposited. These may be purified by repeated crystallizations from boiling alcohol, producing finally the white alkaloid, hydrastine, which forms in colorless, brilliant prisms, insoluble in cold water.

Average dose.—0.060 Gm.=10 milligrammes ($\frac{1}{5}$ grain).

Hydrastine Hydrochloride. $C_2H_2NO_6 \cdot HCl$. This may be prepared by dissolving the alkaloid hydrastine in diluted hydrochloric acid, evaporating the solution and crystallizing. This is readily soluble in water and may be used for injections and lotions. The dose is $\frac{1}{2}$ to 1 grain.

Hydrastine Sulphate. This may be prepared by dissolving the alkaloid hydrastine in diluted sulphuric acid, concentrating the solution and crystallizing. Its uses and dose are the same as the hydrochloride.

HYDRASTININÆ HYDROCHLORIDUM. U. S.

Hydrastinine Hydrochloride.



"The hydrochloride of an artificial alkaloid derived from hydrastine. It should be kept in well-stoppered bottles." <U. S.

This is a yellowish, bitter powder, soluble in 1 part of water or 3 parts of alcohol. It is used by hypodermic injection, 8 to 15 minims of a 10% solution, or is given in doses of $\frac{1}{4}$ to $\frac{1}{2}$ grain. It increases the blood pressure, acting as a contractile, and is used for uterine hemorrhage, menorrhagia etc.

Average dose.—0.030 Gm.=30 milligrammes ($\frac{1}{2}$ grain).

HYDRASTIS. U. S. Golden Seal.

Hydrastis Rhizoma. Br. Hydrastis Rhizome.

"The dried rhizome and roots of *Hydrastis Canadensis*, Linné (Fam. Ranunculaceæ), yielding, when assayed by the process given, not less than 2.5 percent. of hydrastine." <U. S.

"The dried rhizome and roots of *Hydrastis Canadensis*." <Br.

This plant, commonly known as Golden Seal, is found chiefly in western and north-western United States, in woodlands. It was used by the Indians for staining yellow and for dyeing. It is a favorite remedy for catarrhal conditions of the mucous membrane and is used in dyspepsia, liver complaints, catarrh of the stomach and bowels, nasal catarrh, leucorrhœa, gonorrhœa etc. A variety of preparations of it are made both to take and use for injections, and the powdered root is often used in snuffs and douches for catarrh.

Average dose.—2 Gm. (30 grains).

Hydrastin. The B. P. C. Formulary, 1901, gives the following formula for this preparation:

Hydrastis Rhizome, in No. 60 powder,	1 pound
Alcohol, (60%), a sufficient quantity.	

Moisten the rhizome with 8 fl.ounces of the alcohol; pack in a percolator; gradually pour on more alcohol until the hydrastis is exhausted; collect the liquid and remove the alcohol by distillation; evaporate the residue to dryness and reduce to a fine powder. Transfer immediately to a well-closed bottle. Dose, $\frac{1}{2}$ to 2 grains.

This consists chiefly of berberine, hydrastine, and the resinous matter of the root. It will be seen that this is simply a dry alcoholic extract of the drug.

HYDRAZINE. Diamine.



This is a general poison to animal and vegetable life. It kills the germs of mould, and 1 part in 1000 destroys bacteria. It is a valuable preservative for anatomical specimens and vegetable or animal solutions, but owing to its poisonous nature it cannot be used in articles intended to be used as food.

Hydrazine Sulphate. This may be prepared by neutralizing diluted sulphuric acid with hydrazine, concentrating and crystallizing. It is much more soluble than the alkaloid.

HYDROGENUM — HYDROGEN.

Symbol H; Atomic Weight (O=16) 1.008; Sp. gr. 1.

The element Hydrogen is a colorless, odorless, inflammable gas, the lightest of all known substances. It rarely exists in nature in a free state, but combined with other substances in gases, liquids and solids, from which it may be obtained by chemical action.

In chemistry it is one of the most important elements, being used as the standard of comparison for all others, its atomic weight being taken as unity. It unites with all the gaseous elements, and a few metals and not-metals, forming binary compounds called Hydrides. It is present in water, in all true acids, and in all organic radicals. Its affinity in the molecules of substances is less than that of most metals and other basic substances, and it is therefore replaced wholly or partly in the molecules by other bases when they are brought together. It forms gaseous binary combinations with the haloid elements, bromine, chlorine, iodine and fluorine, the solutions of which in water are called Hydroacids, as hydrobromic acid etc. It forms compounds with antimony, arsenic, copper, phosphorus, sulphur, selenium, silicon and tellurium. With oxygen it forms two oxides, water, H_2O , and hydrogen dioxide, H_2O_2 , and with nitrogen it unites, forming ammonia, H_3N . Its compounds with carbon form an extensive series of radicals known as Hydrocarbons, among which are included the alcohol and benzene radicals; and it is a constituent of all alkaloids and other principles of plants.

Hydrogen Dioxide or Peroxide. H_2O_2 . This is made by decomposing barium dioxide by hydrochloric acid in the presence of ice-

cold water, and the precipitation of the newly formed barium chloride by means of silver sulphate, hydrogen dioxide remaining in solution.

It is liberated from barium dioxide by the action of phosphoric and sulphuric acids. (See Aqua Hydrogenii Dioxide). The solution of this gas in water has come into extensive use in the past few years for various purposes. It is used in surgery as an antiseptic and is much employed also as a bleaching agent, especially for hair, which it bleaches to a rich golden color. **Blondine**, a proprietary preparation for this purpose, is chiefly composed of this solution.

Hydracids. The inorganic acids which are formed by the combination of hydrogen with non-metallic elements, and do not contain oxygen, are known as Hydracids. They are hydrobromic acid, hydrochloric acid, hydrofluoric acid, hydrosulphuric acid, hydriodic acid and hydrocyanic acid.

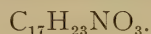
HYDROQUINONE. Quinol.

Hydrochinonum. Paradioxybenzolum.



This preparation is isomeric with resorcin, and is made by oxidizing aniline with chromic acid and reducing the quinone, $\text{C}_6\text{H}_4\text{O}_2$, which is formed, with sulphurous acid. It is crystalline, antifermentative, antiseptic and antipyretic. Dose, 8 to 12 grains. Also used as a developer in photography.

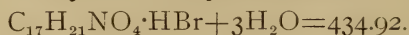
HYOSCINE.



One of the alkaloids obtained from hyoscyamus. It is a liquid of the consistence of glycerin, and is obtained in a similar manner as atropine or other similar alkaloids. Its salts are generally used in medicine, the hydrobromide being now official in the U. S. Besides this salt, hyoscine hydrochloride, hyoscine hydriodide, and hyoscine sulphate are prepared in the same manner, and have the same properties and dose as the hydrobromide.

HYOSCINÆ HYDROBROMIDUM. U. S., Br.

Hyoscine Hydrobromide.



"The hydrobromide $[\text{HBr} \cdot \text{C}_{17}\text{H}_{21}\text{NO}_4 + 3\text{H}_2\text{O}]$ of an alkaloid, chemically identical with scopolamine, obtained from hyoscyamus and other plants of the Solanaceæ. It should be kept in well-stoppered, amber-colored vials." < U. S.

"The hydrochloride of an alkaloid contained in hyoscyamus leaves, different species of scopola, and possibly other solanaceous plants." < Br. Syn. Scopolamine Hydrobromide.

This may be prepared by neutralizing hydrobromic acid with the liquid alkaloid hyoscine, and concentrating the solution to an amor-

phous powder. It is given in trituration or tablet triturates, the dose being $\frac{1}{20}$ to $\frac{1}{60}$ grain; also in solution by hypodermic injection, $\frac{1}{150}$ to $\frac{1}{100}$ grain.

Average dose.—0.0005 Gm.=0.5 milligramme ($\frac{1}{128}$ grain).

HYOSCYAMINE.



This alkaloid is obtained chiefly from hyoscyamus, but is also found in belladonna and other species of solanaceæ. It may be prepared from hyoscyamus in the same manner as is directed for making atropine from belladonna, or by precipitating a solution of hyoscyamine sulphate with ammonia water. It is in the form of white silky crystals. The soluble salts are generally used in practice. Hyoscyamine hydrobromide and sulphate are official in the U. S. P. Hyoscyamine hydrochloride and hyoscyamine hydriodide are also made and sometimes used, the dose being the same as the sulphate.

HYOSCYAMINÆ HYDROBROMIDUM. U. S.

Hyoscyamine Hydrobromide.



"The hydrobromide [$\text{HBr}\cdot\text{C}_{17}\text{H}_{23}\text{NO}_3$] of an alkaloid obtained from hyoscyamus, and other plants of the Solanaceæ. It should be kept in small, well-stoppered vials." < U. S.

This may be prepared by neutralizing hydrobromic acid with hyoscyamine alkaloid, and concentrating by evaporation at a low degree of heat to an amorphous powder.

It is anodyne, hypnotic and antispasmodic, used chiefly by hypodermic injection. Dose, $\frac{1}{120}$ to $\frac{1}{60}$ grain.

Average dose.—0.0005 Gm.=0.5 milligramme ($\frac{1}{128}$ grain).

HYOSCYAMINÆ SULPHAS. U. S., Br.

Hyoscyamine Sulphate.



"The neutral sulphate [$\text{SO}_2(\text{OH})_2\cdot(\text{C}_{17}\text{H}_{23}\text{NO}_3)_2$] of an alkaloid obtained from hyoscyamus and other plants of the Solanaceæ. It should be kept in small, well-stoppered vials." < U. S.

"The sulphate of an alkaloid contained in hyoscyamus leaves, and possibly other Solanaceous plants." < Br.

This may be prepared by neutralizing diluted sulphuric acid with the alkaloid hyoscyamine, and concentrating by a low degree of heat to an amorphous powder. It is used for the same purposes and in the same dose as the hydrobromide.

Average dose.—0.0005 Gm.=0.5 milligramme ($\frac{1}{128}$ grain).

HYOSCYAMUS. U. S. Hyoscyamus.

Hyoscyami Folia. Br. Hyoscyamus Leaves. Henbane Leaves.

"The dried leaves and flowering tops of *Hyoscyamus Niger*, Linné (Fam. Solanaceæ), collected from plants of the second year's growth; and yielding, when assayed by the process given, not less than 0.08 percent. of mydriatic alkaloids." < U. S.

"The fresh leaves and flowers, with the branches to which they are attached, of *Hyoscyamus niger*, Linn.; also the leaves and the flowering tops, separated from the branches and carefully dried. Collected from the flowering biennial plants." < Br.

This plant, which is commonly called "henbane," is a large herb having an offensive odor, which grows as a weed on waste ground throughout the northern and western United States, and throughout northern and central Europe. Its tinctures and fluidextracts are considerably used in medicine; also the solid extract prepared from the fresh or dried tops, and hyoscyamus oil, which is an infusion of the fresh plant in olive oil. The root and seeds are also used in medicine. The dose of the powdered leaves is from 5 to 10 grains, but the fluid preparations or the solid extract are generally given. Its properties are similar to belladonna. Two alkaloids, which will be found under other titles, are obtained from the plant.

Average dose of powdered leaves.—0.250 Gm.=250 milligrammes (4 grains).

HYPERIDAL 606.

This is a name given to Prof. Ehrlick's latest syphilis remedy—a later combination than Salversan, "606." It is said to be only one-third as toxic as the latter. It is put up in tubes and labeled "Hy." Little is yet known of it except as stated by its manufacturers.

ICHTHYOL. Ammonium Ichthyol Sulphonate.

This substance is prepared by the dry distillation of a certain bituminous mineral containing fossil fish. The portion passing over between 200° and 225°C. is collected, treated with an excess of concentrated sulphuric acid, then with ammonium carbonate or other alkali, to free it from excess of acid. It is a thick, tarry, brownish liquid, containing from 10 to 15 percent. of sulphur combined in a form not easily separated, nor yet well understood. It is freely soluble in water and in a mixture of alcohol and glycerin, but only sparingly soluble in alcohol alone. It mixes freely with oils. Ichthyol is used as an application in cutaneous affections and for inflammatory conditions, gonorrhœa etc. It is made into an ointment with petrolatum from 5 to 50 percent. strength. It may be used as an injection, 1 to 2 percent., with olive oil or mineral glycerin. It is sometimes given internally in emulsion in doses of from 3 to 10 minims, also in pills or

capsules. Ichthyol ammonium and ichthyol sodium are similar, varying only in the alkali used in neutralizing excess of acid.

INFUSA — INFUSIONS.

Infusions are preparations in which the medicinal strength of the drug is obtained by infusing or steeping it in hot water without boiling. They were formerly much used, but, on account of the superior convenience and greater reliability of fluidextracts and other modern galenicals, are now but little employed except by the "old time" physicians. The present U. S. P. contains 3 of the 31 infusions that were formerly official. The Br. P. contains 22.

As infusions (with the exception of Infusion Digitalis of the U. S. P.), contain no alcohol or other preservative, they will keep only for a short time and must be freshly made when wanted.

It has become the custom in this country when infusions are wanted for prescriptions, to mix the fluidextract of the drug directed, an equivalent quantity, with the water directed to be used.

This practice, although very convenient, is not to be commended.

The following are the infusions official in the U. S. P.:

General Formula for Infusions.

The U. S. P. gives a general formula for infusions not specified in the pharmacopœia, from which they may be prepared, as follows:

The substance, coarsely comminuted, 50 Gm. (or $\frac{1}{2}$ ounce av.).

Boiling Water, 1000 Cc. (or 10 fl.ounces).

Water, a sufficient quantity.

"Introduce the substance into a suitable vessel provided with a cover, pour upon it the boiling water, cover the vessel tightly and let it stand for half an hour in a warm place. Then strain, with expression, and pass enough water through the strainer to make the infusion measure 1000 Cc. (or 10 fl.ounces)." <U. S.

By Water-Bath Percolation.

It is evident from the nature of infusions that the water-bath percolator is the most convenient vessel in which to make them.

This formula may be used for making all infusions which may be prescribed or directed, except those for which formulæ are given:

The substance, coarsely ground, 1 part or 1 ounce.

Water, sufficient to make 20 parts or 20 ounces

Having adjusted the perforated diaphragm or strainer in the bottom of a small-sized percolator, put the substance in the percolator and pour boiling water upon it. Cover the percolator closely with the cover, and having filled the vessel surrounding the percolator two-thirds full of hot water, heat nearly to boiling, continue the heat moderately for half an hour and draw off the liquid by means of the stop-cock, adding enough water through the percolator to make 20 parts of the preparation.

INFUSUM DIGITALIS. U. S. Infusion of Digitalis.

Digitalis, bruised,	15 Gm. or 200 grains
Alcohol,	100 Cc. or 3 fl.ounces
Cinnamon Water,	150 Cc. or 4½ fl.ounces
Boiling Water,	500 Cc. or 15 fl.ounces
Cold Water, a sufficient quantity	

To make 1000 Cc. or 30 fl.ounces

"Upon the digitalis, contained in a suitable vessel, pour the boiling water, and allow it to macerate for 1 hour. Then strain, add the alcohol and cinnamon water to the strained liquid, and pass enough cold water through the residue on the strainer to make the product measure 1000 Cc. (or 30 fl.ounces)." <U. S.

Average dose.—8 Cc. (2 fl.drachms).

INFUSUM PRUNI VIRGINIANÆ. U. S.**Infusion of Wild Cherry.**

Wild Cherry, in No. 20 powder,	40 Gm. or 1 ounce
Glycerin,	50 Cc. or 1⅙ ounce
Water, q. s. to make	1000 Cc. or 25 fl.ounces

"Moisten the powder with 60 Cc. (or 1½ fl.ounces) of water, and allow it to macerate for 1 hour; then pack it firmly in a conical glass percolator, and, having placed the glycerin in the receiving bottle, gradually pour water upon the powder and continue the percolation until the infusion measures 1000 Cc. (or 25 fl.ounces). Mix well." <U. S.

Average dose.—60 Cc. (2 fl.ounces).

It will be observed that cold water, instead of boiling water is used in making this infusion.

INFUSUM SENNÆ COMPOSITUM. U. S.**Compound Infusion of Senna.**

Senna,	60 Gm. or 1 ounce
Manna,	120 Gm. or 2 ounces
Magnesium Sulphate,	120 Gm. or 2 ounces
Fennel, bruised,	20 Gm. or 146 grains
Boiling Water,	800 Cc. or 14 fl.ounces
Cold Water, q. s. to make	1000 Cc. or 16 fl.ounces

"Upon the senna, manna, and fennel, contained in a suitable vessel, pour the boiling water, and allow it to macerate for half an hour. Then strain, with expression; dissolve the magnesium sulphate in the infusion and again strain. Lastly add enough cold water through the strainer to make the infusion measure 1000 Cc. (or 16 fl.ounces)." <U. S.

Average dose.—120 Cc. (4 fl.ounces).

This infusion was formerly a very popular cathartic, and was known as **Black Draught**.

Infusions of the Br. P.

The following are the infusions now official in the Br. P., most of them were formerly official in the U. S. P.

Infusum Aurantii. Infusion of Orange Peel. Dried bitter orange peel, cut small, 1 ounce (or 50 Gm.); distilled water, boiling, 20 fl.ounces (or 1000 Cc.). Infuse in a covered vessel for 15 minutes, strain. Dose, $\frac{1}{2}$ to 1 fl.ounce.

Infusum Aurantii Compositum. Compound Infusion of Orange Peel. Dried bitter orange peel, cut small, $\frac{1}{2}$ ounce (or 25 Gm.); fresh lemon peel, cut small, $\frac{1}{4}$ ounce (or 12.5 Gm.); cloves, bruised, 55 grains (or 6.25 Gm.); boiling distilled water, 20 fl.ounces (or 1000 Cc.). Infuse in a covered vessel for 15 minutes, strain. Dose, $\frac{1}{2}$ to 1 fl.ounce.

Infusum Buchu. Infusion of Buchu. Buchu leaves, freshly broken, 1 ounce (or 50 Gm.); boiling distilled water, 20 fl.ounces (or 1000 Cc.). Infuse in a covered vessel for 15 minutes, strain. Dose 1 to 2 fl.ounces.

Infusum Calumbæ. Infusion of Columba. Columba root, thinly sliced, 1 ounces (or 50 Gm.); distilled water, 20 fl.ounces (or 1000 Cc.). Infuse for half an hour, strain. Dose, $\frac{1}{2}$ to 1 fl.ounce.

Infusum Carophylli. Infusion of Cloves. Cloves, bruised, $\frac{1}{2}$ ounce (or 25 Gm.); boiling distilled water 20 fl.ounces (or 1000 Cc.). Infuse in a covered vessel for 15 minutes, strain. Dose, $\frac{1}{2}$ to 1 fl.ounce.

Infusum Cascarillæ. Infusion of Cascarilla. Cascarilla, in No. 10 powder, 1 ounce (or 50 Gm.); boiling distilled water 20 fl.ounces (or 1000 Cc.). Infuse in a covered vessel for 15 minutes, strain. Dose, $\frac{1}{2}$ to 1 fl.ounce.

Infusum Chirataë. Infusion of Chiretta. Chiretta, 1 ounce (or 50 Gm.); boiling distilled water 20 fl.ounces (or 1000 Cc.). Infuse in a covered vessel 15 minutes, strain. Dose, $\frac{1}{2}$ to 1 fl.ounce.

Infusum Cinchonæ Acidum. Acid Infusion of Cinchona. Red cinchona bark, in No. 40 powder, 1 ounce (or 50 Gm.); aromatic sulphuric acid 2 fl.drachms (or $12\frac{1}{2}$ Cc.); boiling distilled water 20 fl.ounces (or 1000 Cc.). Mix the red cinchona bark with the distilled water in a covered vessel, add the aromatic sulphuric acid, infuse for 1 hour, strain. Dose, $\frac{1}{2}$ to 1 fl.ounce.

Infusum Cuspariæ. Infusion of Cusparia. Cusparia bark, in No. 20 powder, 1 ounce (or 50 Gm.); distilled water, boiling, 20 fl.ounces (or 1000 Cc.). Infuse in a covered vessel for 15 minutes, strain. Dose, 1 to 2 fl.ounces.

Infusum Digitalis. Infusion of Digitalis. Digitalis leaves, in No. 20 powder, 60 grains (or 6.8 Gm.); boiling distilled water 20 fl.ounces (or 1000 Cc.). Infuse in a covered vessel for 15 minutes, strain. Dose, 2 to 4 fl.drachms.

Infusum Ergotæ. Infusion of Ergot. Ergot, freshly crushed, 1 ounce (or 50 Gm.); boiling distilled water 20 fl.ounces (or 1000 Cc.). Infuse in a covered vessel for 15 minutes, strain. Dose, 1 to 2 fl.ounces.

Infusum Gentianæ Compositum. Compound Infusion of Gentian. Gentian root, thinly sliced, $\frac{1}{4}$ ounce (or 12.5 Gm.); dried bitter orange peel, cut small, $\frac{1}{4}$ ounce (or 25 Gm.); boiling distilled water 20 fl.ounces (or 1000 Cc.). Infuse in a covered vessel 15 minutes, strain. Dose $\frac{1}{2}$ to 1 fl.ounce.

Infusum Krameriaæ. Infusion of Krameria. Krameria root, bruised, 1 ounce (or 50 Gm.); boiling distilled water 20 ounces (or 1000 Cc.). Infuse in a covered vessel 15 minutes, strain. Dose, $\frac{1}{2}$ to 1 fl.ounce.

Infusum Lupuli. Infusion of Hops. Hops, freshly broken, 1 ounce (or 50 Gm.); boiling distilled water 20 ounces (or 1000 Cc.). Infuse in a covered vessel 15 minutes, strain. Dose, 1 to 2 fl.ounces.

Infusum Quassiaæ. Infusion of Quassia. Quassia wood, rasped, 88 grains (or 10 Gm.); distilled water 20 ounces (or 1000 Cc.). Infuse in a covered vessel 15 minutes, strain. Dose, $\frac{1}{2}$ to 1 fl.ounce.

Infusum Rhei. Infusion of Rhubarb. Rhubarb root, in thin slices, 1 ounce (or 50 Gm.); boiling distilled water 20 ounces (or 1000 Cc.). Infuse in a closed vessel 15 minutes, strain. Dose, $\frac{1}{2}$ to 1 fl.ounce.

Infusum Rosæ Acidum. Acid Infusion of Roses. Red rose petals, dried and broken, $\frac{1}{2}$ ounce (or 25 Gm.); diluted sulphuric acid 2 fl.drachms (or 12.5 Cc.); boiling distilled water 20 ounces (or 100 Cc.). Add the diluted sulphuric acid to the distilled water, infuse the red rose petals in the mixture in a covered vessel for 15 minutes, strain. Dose, $\frac{1}{2}$ to 1 fl.ounce.

Infusum Scoparii. Infusion of Broom. Broom tops, dried and bruised, 2 ounces (or 100 Gm.); boiling distilled water 20 ounces (or 1000 Cc.). Infuse in a closed vessel 15 minutes, strain. Dose, 1 to 2 fl.ounces.

Infusum Senegæ. Infusion of Senega. Senega root, in No. 40 powder, 1 ounce (or 50 Gm.); boiling distilled water 20 ounces (or 1000 Cc.). Infuse in a covered vessel half an hour, strain. Dose, $\frac{1}{2}$ to 1 fl.ounce.

Infusum Sennæ. Infusion of Senna. Senna, 2 ounces (or 100 Gm.); ginger, sliced, 55 grains (or 6.25 Gm.); boiling distilled water 20 ounces (or 1000 Cc.). Infuse in a covered vessel 15 minutes, strain. Dose, $\frac{1}{2}$ to 1 fl.ounce; as a draught, 2 fl.ounces.

Infusum Serpentariaæ. Infusion of Serpentary. Serpentary rhizome, in No. 10 powder, 1 ounce (or 50 Gm.); boiling distilled water 20 ounces (or 1000 Cc.). Infuse in a covered vessel 15 minutes, strain. Dose, $\frac{1}{2}$ to 1 fl.ounce.

Infusum Uvæ Ursi. Infusion of Bearberry. Bearberry leaves, bruised, 1 ounce (or 50 Gm.); boiling distilled water 20 ounces (or 1000 Cc.). Infuse in a covered vessel 15 minutes, strain. Dose, $\frac{1}{2}$ to 1 fl.ounce.

INFUSA CONCENTRATA. Concentrated Infusions.

The B. P. C. Formulary gives two formulas for concentrated infusions that will be recognized as useful preparations to keep on hand for the preparation of the regular infusions of digitalis and gentian compound. The formulas are:

Infusum Digitalis Concentratum. Concentrated Infusion of Digitalis.

Digitalis Leaves, in No. 20 powder,	480 grains
Alcohol, (90%),	5 fl.ounces
Distilled Water, a sufficient quantity.	

Macerate the digitalis with 15 fl.ounces of water for 24 hours, strain, and to 10 fl.ounces of the strained liquor add the alcohol. Again macerate the leaves with a second 15 fl.ounces of distilled water for 6 hours and strain; macerate with a third 15 fl.ounces of distilled water for 6 hours, then strain. Mix the residue of the first with the second and third liquors, and evaporate at a low temperature to 5 fl.ounces, and add it to the portion set aside to make 20 fl.ounces.

This is eight times the strength of the Br. P. Infusum Digitalis.

Dose, 15 to 30 minims.

Infusum Gentianæ Compositum Concentratum.**Concentrated Compound Infusion of Gentian.**

Gentian Root, in No. 20 powder,	2 ounces
Dried Bitter Orange Peel,	2 ounces
Dried Lemon Peel,	1 ounce
Tincture of Fresh Lemon Peel,	1 fl.ounce
Alcohol, (90%),	4 fl.ounces
Distilled Water, a sufficient quantity.	

Mix the gentian, bitter orange and dried lemon peel, and pour over them 20 fl.ounces of distilled water; macerate 24 hours and press off the liquor. Reserve 10 fl.ounces, and add to it the tincture of lemon peel and alcohol. Treat the marc with two further macerations of 20 fl.ounces of distilled water for 6 hours each, press off, and mix the liquors, adding any left from the first maceration. Evaporate to 5 fl.ounces, and add it to the first portion to make 20 fl.ounces.

This is eight times the strength of the B. P. Infusum Gentianæ Compositum.

Dose, $\frac{1}{2}$ to 1 fl.drachm.

INJECTIO HYPODERMICA — HYPODERMIC INJECTIONS.**Hypodermic Injections of the Br. P.**

Injectio Apomorphinæ Hypodermica. Hypodermic Injection of Apomorphine. Apomorphine hydrochloride 1 grain (or 0.1 Gm.), diluted hydrochloric acid 1 minim (or 0.1 Cc.), distilled water 110

minims (or 10 Cc.), or a sufficient quantity. Boil the distilled water for a few minutes; cool; add the diluted hydrochloric acid; dissolve the apomorphine hydrochloride in the resulting liquid; add, if necessary, sufficient recently boiled and cooled distilled water to produce 110 minims (or 10 Cc.) of the injection.

Dose, by subcutaneous injection, 5 to 19 minims. This injection should be recently prepared. 110 minims contain 1 grain of the salt; 100 Cc. contain 1 gramme.

Injectio Cocainæ Hypodermica. Hypodermic Injection of Cocaine. Cocaine hydrochloride 33 grains (or 1 Gm.), salicylic acid $\frac{1}{2}$ grain (or 0.015 Gm.), distilled water 6 fl.drachms (or 10 Cc.), or a sufficient quantity. Boil the distilled water; add the salicylic acid; dissolve the cocaine hydrochloride in the solution when cool; add, if necessary, sufficient recently boiled and cooled distilled water to produce 6 fl.drachms (or 10 Cc.) of the injection.

Dose, by subcutaneous injection, 5 to 10 minims. 110 minims contain about 10 grains of cocaine hydrochloride; 100 Cc. contain 10 Gm.

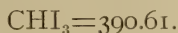
Injectio Curare Hypodermica. Hypodermic Injection of Curare. Curare (the South American Indian arrow poison), 5 grains, distilled water a sufficient quantity. Reduce the curare to powder in such a way as to prevent its coming in contact with the naked hand, and add distilled water to form a thin paste. Transfer to a small funnel plugged with cotton-wool, and gradually pour upon it distilled water until 1 fl.drachm is obtained. If the injection be required in haste, proceed in the following manner:—To the 5 grains of curare reduced to powder, add 1 fl.drachm of distilled water, throw on a filter, and when the liquid ceases to drop pour over the contents of the filter distilled water sufficient to produce 1 fl.drachm. Dose, by subcutaneous injection, 1 to 6 minims. B. P. C.

Injectio Ergotæ Hypodermica. Hypodermic Injection of Ergot. Extract of ergot 100 grains (or 10 Gm.), phenol 3 grains (or 0.3 Gm.), distilled water 220 minims (or a sufficient quantity). Mix the phenol with the distilled water; boil for a few minutes, cool; add the extract of ergot, and, if necessary, sufficient recently boiled and cooled distilled water to produce 330 minims (or 30 Cc.) of the injection.

Dose, by subcutaneous injection, 3 to 10 minims. This injection should be recently prepared. 110 minims contain about 33 grains of extract of ergot; 100 Cc. contain about 33 Gm.

Injectio Morphinæ Hypodermica. Hypodermic Injection of Morphine. Morphine tartrate 50 grains (or 5 Gm.), distilled water, a sufficient quantity. Dissolve the morphine tartrate in sufficient recently boiled and cooled distilled water to produce 1100 minims (or 100 Cc.) of the injection.

Dose, by subcutaneous injection, 2 to 5 minims. 110 minims contain 5 grain of morphine tartrate; 100 Cc. contain 5 Gm.

IODOFORMUM. U. S., Br. Iodoform.

"Triiodomethane, usually obtained by the action of iodine upon alcohol, in the presence of an alkali or alkaline carbonate. Iodoform should be kept in well-stoppered bottles in a cool and dark place." <U. S.

"Iodoform, or tri-iodomethane, CHI_3 , is a product of the action of iodine on ethylic alcohol in the presence of solution of potassium carbonate." <Br.

This was first prepared by Sérullas in 1822, but was not known in medicine for some time afterwards. It was first made official in the 1870 U. S. P.

To prepare iodoform, Felhol's process is usually chosen as being most economical. Two parts of crystallized sodium carbonate are dissolved in 10 parts of water and 1 part of alcohol, by the aid of gentle heat; 1 part of iodine is then added to the solution in small portions, and, after cooling, the crystals are collected, and the solution, or mother liquor, filtered. This is warmed, 2 parts of sodium carbonate are again added, and a current of chlorine passed rapidly through the mixture as long as iodoform is separated. The crystals are then washed with a little cold water and carefully dried.

Iodoform is nearly insoluble in water, but soluble in ether, alcohol, chloroform, benzin and oils. It has a peculiar, disagreeable odor, which makes it objectionable in medicines, but this may be in a measure overcome by the addition of oil of peppermint or other strongly flavored oils.

Uses. Iodoform is given internally as an alterative, in doses of 1 to 3 grains, but is chiefly used in the form of ointment, in suppositories, and as a dusting for sores, ulcers, syphilitic growths and diseased surfaces. It is also largely used as a surgical dressing in the form of iodoform cotton and gauze, which is made by dissolving 24 grains of iodoform in a mixture of 4 fl.drachms of alcohol with 2 drachms of ether, and adding 2 drachms of glycerin, saturating 360 grains of purified cotton or gauze with the liquid, and drying by exposure to the air.

Average dose, internally.—0.250 Gm.=250 milligrammes (4 grains).

Iodoform Substitutes.

Many preparations of iodoform have been introduced, and, owing to its disagreeable odor, many devices for disguising its odor, and many substitutes have been proposed. The following are mentioned:

Iodol Caffeine is a combination of iodol and caffeine. Uses similar to iodol.

Iodo-Casein. A yellowish, odorless powder, recommended as a substitute for iodoform.

Iodoform Substitute. Acetanilid 4 ounces, boric acid 4 ounces. Reduce them to impalpable powder and pass through a fine sieve.

Iodol. Tetraiodopyrrol. Produced by the interaction of iodine and pyrrol in alcoholic solutions. The solutions are mixed, allowed to stand for 24 hours with frequent agitation, the mixture is then diluted with water and iodol separates. Iodol is a pale-yellow, crystalline, bulky powder without taste or odor, insoluble in water and only slightly soluble in alcohol. It is recommended as a substitute for iodoform for dusting, and may be given internally in doses of from 8 to 15 grains.

Iodomuth. A mixture of iodoform 20 parts, with bismuth subcarbonate 80 parts. Used as a dusting for sores and ulcers, or may be administered internally in doses of 3 to 10 grains.

Itrol. A fine, dry, odorless powder, used as a dusting for surgical dressing, also in ointment, 1 to 2 percent. A solution 1:4000 is used for disinfecting hands and instruments.

IODUM. U. S., Br. Iodine.

Symbol I; Atomic weight ($O=16$) 126.92; Sp. gr. 4.95.

Iodine is a non-metallic element, first discovered by De Courtois, in 1812, examined and described in 1813, by M. Clements, and assigned a place as an element soon afterward by Sir H. Davy and M. Gay-Lussac.

It is chiefly obtained from kelp, the ashes of sea-weeds gathered off the coast of Scotland, by percolating the ashes with water, filtering the percolate, concentrating it by evaporation to a small volume, removing the crystalline salts as they form in the liquid during evaporation, and adding finally to the dark-brown liquid residue, which is called iodine lye, sulphuric acid in excess. After standing, the liquid is decanted, heated to about 140°F. , and mixed with manganese dioxide, as much as was used of acid. The whole is then introduced into a cylindrical leaden still, heat is applied and the vapor of iodine which rises is condensed in glass receivers. It is then "resublimed," and in this form is furnished to the trade.

Iodine, Bromine, Chlorine and Fluorine are classed in chemistry as halogens (salt producers). Their characteristics and properties are similar.

Iodides. Iodine unites with most of the metallic bases forming a class of salts called Iodides; with hydrogen it forms hydriodic acid which also combines with bases to form iodides, the hydrogen being displaced.

Iodates. With oxygen it forms iodic and periodic anhydrides, which unite with bases in the presence of water, forming iodates.

In pharmacy iodine is used in the form of tincture, solutions and ointments, and for making hydriodic acid, iodoform and many well

known salts etc. Medicinally, it is seldom used in solution or admixture with other substances. The combinations of iodine with bases are noticed under the basic substances. The following are the combinations of iodine with hydrogen and oxygen, called acids:

Acids of Iodine.

Hydriodic Acid. HI. A solution of this gas in water is made by passing a current of hydrosulphuric acid gas through a solution of iodine until it acquires a pure yellowish-color and ceases to turn brown on shaking. A simple process for preparing this acid is now official in the U. S. P. under the title *Acidum Hydriodicum*, which see. This contains 10 percent. of real hydriodic acid in solution.

The syrup of hydriodic acid, which is official, contains 1 percent. of the real acid.

Iodic Acid or Anhydride. HIO_3 . This is made by heating 1 part of iodine with 10 parts of nitric acid in a retort until the iodine is dissolved and fumes cease to be evolved. The solution is then evaporated and the residue heated to 200°F ., until all traces of nitric acid are removed. The white powder is Iodic Anhydride.

Periodic Acid or Anhydride. HIO_4 . By adding 1 part of iodine to 7 parts of sodium carbonate dissolved in 100 parts of water, and passing chlorine into the heated liquid until a precipitate ceases to form. Collect this precipitate, dissolve it in pure nitric acid then add silver nitrate, and dissolve the precipitate which forms in hot diluted nitric acid. Concentrate the solution and crystallize, then re-dissolve the crystals in water and re-crystallize.

Iodine Compounds.

Iodine and its compounds are more fully considered in the Chemical Section, Part I.

Iodine Bromide, Iodine Chloride, Iodine Cyanide, Iodine Trichloride have recently been introduced. The latter is attracting some attention as an antiseptic and antizymotic in the treatment of cutaneous diseases, gonorrhoea etc., and for internal administration for fermentive dyspepsia etc. A solution is made for external use, 1:1000, and the dose internally is $\frac{1}{8}$ grain.

Iodantipyrine or Iodopyrine is, as the name suggests, a compound of iodine and antipyrine, one atom of hydrogen in the benzene nucleus being replaced by iodine. It is a white, crystalline substance, having similar properties as antipyrine, and is given for the same conditions and in the same doses, 8 to 15 grains.

Iodalbin. A combination of iodine with albumin. A reddish-brown powder soluble in alkali solutions. Dose 5 to 15 grains.

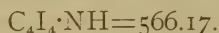
Iodipin. A 10 percent. solution of iodine in sesame oil. Prepared by heating them together at a moderate heat until solution is effected. A yellowish, oily fluid having the properties of iodine and used as an alterative in doses of 1 to 4 drachms.

Iodo-Caffeine. A combination of iodine and caffeine, in colorless crystals, recommended in heart and liver troubles. Dose, 5 to 7 grains.

Iodo-Phenine. Iodophenacetine. In fine crystals resembling potassium permanganate. It is antiseptic and irritant, and may be used in antiseptic ointments.

Iodothyrene. Thyroidin. A thyroid combination forming a nearly white powder which does not decompose. It is an alterative and discutient. Dose 5 to 10 grains.

IODOLUM. U. S. Iodol.



"Tetraiodopyrrol, a derivative of the base pyrrol, obtained by the direct action of iodine upon the base in the presence of alcohol. Iodol should be preserved in amber-colored bottles, protected from light." <U. S.

This is a light grayish-brown crystalline powder, without odor or taste. It is soluble in about 4900 parts of water, 9 parts of alcohol, 1.5 parts of ether, 105 parts of chloroform, at 25°C. (77°F.).

Uses. This is intended as an odorless substitute for iodoform, having the same properties and action. Used as a dressing and dusting for wounds and sores and internally as an antiseptic and absorbent.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

IPECACUANHA. U. S. Ipecac.

Ipecacuanhæ Radix. Br. *Ipecacuanha Root.*

"The dried root, to which may be attached a portion of the stem not exceeding 7 Cm. in length, of *Cephaelis Ipecacuanha* (Brotero) A. Richard (Fam. Rubiaceæ), known commercially as Rio, Brazilian or Para ipecac, or the corresponding portion of *C. acuminata*, Karsten, known commercially as Carthegena ipecac, yielding, when assayed by the process given, not less than 2 percent. of ipecac alkaloids." <U. S.

"The dried root of *Psychotria Ipecacuanha*, Stokes." <Br.

The plant is a native of Brazil, but is found in other South American states. It is gathered and chiefly exported from Rio Janiero and adjacent ports.

The root is extensively used in medicine as an expectorant and emetic, a fluidextract being official in the U. S. P., a liquid extract in the Br. P., and several other preparations in which it is the important medicament. The powdered root is an ingredient of Dover's Powder, and is used in many forms as an ingredient of powders, pills, troches etc. The dose of the powder as an expectorant and diaphoretic is from ¼ to 2 grains, and as an emetic from 15 to 30 grains. (Br.).

Average dose.—(U. S.). Expectorant, 0.065 Gm.=65 milligrammes (1 grain). Emetic, 1 Gm. (15 grains).

Emetine. This alkaloid was isolated by Pelletier in 1817, and may be prepared in a similar manner as other alkaloids from roots and barks. It is a very powerful emetic, the dose being $\frac{1}{8}$ grain, repeated every 15 minutes until emesis occurs.

Emetin. This is a principle obtained from ipecac, having the nature of a glucoside, and from it, by the action of an acid, ipecacuanhic acid may be obtained.

It does not, like emetine, represent the active principles of the root.

ISOPRAL.

Trichlorisopropyl alcohol. A crystalline volatile substance, having a camphorous odor and taste. Soluble in 30 parts of water and freely soluble in alcohol and ether. It is used as a hypnotic. Dose 10 to 30 grains.

Izal. A liquid resembling creolin and containing varying proportions of cresols, hydrocarbons and water. Used for the same purpose and in the same manner as creolin.

JALAPA. U. S. Jalap.

"The dried tuberous root of *Excoyonium Purga* (Wenderoth) Benth. (Fam. Convolvulaceæ); yielding, when assayed by the process given, not less than 8 percent. of total resin, but not more than 1.5 percent. of resin soluble in ether." < U. S.

"The dried tubercules of *Ipomœa Purga*, Hayne." < Br.

This tuber is official in all pharmacopœias, different varieties being recognized in different countries, that used in this country being mostly obtained from Mexico. It is a purgative, pure and simple, and has been more used in the past than almost any other medicine. An extract and resin are official in the U. S., but the powdered tuber is more generally used than any other form. The dose of the powder, as a purgative, is from 10 to 30 grains, of the extract, from 4 to 7 grains.

Average dose.—1 Gm. (15 grains).

Convulvin. $C_{31}H_{50}O_{16}$. This name is given to a glucosidal principle obtained from jalap, which represents in a high degree, the activity of the tuber. It is also called rhodeoretin.

Jalapin. $C_{34}H_{56}O_{18}$. This is another principle obtained from jalap which differs from convulvin in being soluble in ether, while convulvin is not.

From both of these glucosides acids are produced, the former known as convulvic acid, and the latter as jalapic acid.

Resinæ Jalapa. U. S. Jalapæ Resina. Br.

Resin of Jalap. Jalap Resin.

The U. S. P. directs jalap in No. 60 powder, 1000 Gm. (or 1 pound), to be moistened with alcohol, packed firmly in a percolator, covered with alcohol and allowed to stand 48 hours, then percolated, adding

alcohol through the percolator until 2500 Cc. (or 2½ pints) of tincture have been obtained. The alcohol is then to be distilled off until the tincture is reduced to 400 Gm. (or 6½ ounces), and this is to be added, with constant stirring, to 9000 Cc. (or 9 pints) of cold water. The precipitate is collected, washed twice with cold water, pressed and dried with gentle heat, stirring occasionally until the moisture has evaporated. The Br. formula is about the same.

Dose, 5 to 20 grains.

KAOLINUM. U. S., Br. Kaolin.

"A native aluminum silicate, chiefly of the pure Silicate [$\text{H}_2\text{Al}_2\text{Si}_2\text{O}_8 + \text{H}_2\text{O} = 257.12$], powdered and freed from gritty particles by elutriation." <U. S.

"A native aluminum silicate, powdered and freed from gritty particles by elutriation." <Br.

This is commonly known as "China Clay," and is now official in several pharmacopœias. It may be employed in pharmacy for clearing liquids, by precipitation, or for filtering liquids clear, but its most important use is as the basis of Cataplasms similar to Antiphlogistine, which are now so extensively used. See Cataplasma Kaolini.

KERATIN.

This substance is prepared from horn scrapings or from quills of bird feathers, by first treating them with pepsin combined with diluted acid for some time, and afterwards dissolving the residue in ammonia water by macerating for several weeks, then evaporating to a fine mass which is afterwards powdered. By this treatment a substance is produced which is insoluble in the juices of the stomach, but dissolves readily in the pancreatic juice. It is therefore, used as a coating for pills, which are designed to pass unchanged through the stomach and be acted upon by the pancreatic juice, which, being alkaline, dissolves the keratin coating.

KINO. U. S., Br. Kino.

"The inspissated juice of *Pterocarpus Marsupium*, Roxburg (Fam. Leguminosæ)." <U. S.

"The juice obtained from incisions in the trunk of *Pterocarpus Marsupium*, Roxby., evaporated to dryness." <Br.

Kino is used in medicine chiefly as an astringent. A tincture is official in the U. S., Br., and several other pharmacopœias. It is soluble in alcohol, but only slightly soluble in cold water. It is used in diarrhœas, leucorrhœa and diabetes, or whenever a strong non-irritant astringent is indicated. It may be used in powder or combined with aromatics, or in tincture. Its solution in hot water may be used as an astringent lotion or injection.

It is also used as an addition to some kinds of wines that are deficient in astringency.

Average dose.—0.500 Gm.=500 milligrammes ($7\frac{1}{2}$ grains).

LAC — MILK.

Milk is obtained from the mammary glands of the cow, goat, sheep or mare, and is the source of many important articles employed in pharmacy and medicine. It consists of about 85 percent. of water and 15 percent. of solid constituents, the most important of which are butter; casein, of which cheese is made; and milk-sugar. The following are the preparations used in pharmacy which are derived from milk:

Koumiss.

This is milk prepared as a beverage or nutritive drink for invalids. It was first introduced by the Russians, who made it by fermenting mare's milk, but it is now quite extensively made in this country from cow's milk, by adding to 1 gallon of sweet skimmed milk 4 ounces of white sugar and one-fourth cake of Vienna yeast. This is allowed to stand in a warm place for a few hours and is then transferred to pint or quart bottles, which are tightly stopped and set in a warm place for a few hours to ferment and then put on their sides in a cool cellar. In about three days it is ready for use. Koumiss does not keep a great while, and when opened, like champagne, loses its gas and becomes worthless. Small quantities, as wanted for use, may be drawn from the bottles by a champagne tap.

The following formula appeared in *The Formulary*, Nov. 1892:

Fresh milk 12 ounces, water 4 ounces, brown sugar $2\frac{1}{2}$ drachms, compressed yeast 14 grains, milk sugar 1 ounce. Dissolve the milk sugar in the water and add to the milk, rub the yeast and brown sugar down in a mortar with a little of the mixture, then strain into the other portion. Strong bottles are very essential, champagne bottles being frequently used, and the corks should fit very tightly and be well driven in, and when fixed, should be wired down. Many failures result because the corks do not fit properly and allow the carbonic acid gas to escape as formed, leaving a worthless preparation. It is further necessary to keep the preparation at a moderate temperature, and to insure the article being properly finished the bottles are to be gently shaken each day for about ten minutes to prevent the clotting of caseine. It is well to take the precaution of rolling a cloth around the bottle during the shaking process, as the amount of gas generated is great, and should the bottle be of thin glass or contain a flaw, it might give away. Some few days elapse before the fermentation passes into the acid stage, and when this has taken place the preparation is much thicker. It is then in the proper condition for use in sickness, being retained by the stomach when almost everything else is rejected.

Coca Koumiss may be made by the addition of fluidextract of coca or cocaine hydrochloride to the milk, and would be specially adaptable in cancer of the stomach.

Euonymized Koumiss is a suitable preparation for use in some cases of derangement of the liver in which food is rejected and a hepatic stimulant is required, combined with a slight sedative. To prepare this add fluidextract of euonymus 3 drachms to every 16 ounces of the diluted milk, then proceed as with ordinary koumiss.

Malted Koumiss may be made as follows: Extract of malt $1\frac{1}{2}$ ounces, compressed yeast 20 grains, brown sugar 10 grains, milk, to nearly fill a champagne pint bottle.

Peptonized Koumiss. The easiest way of making a satisfactory preparation is by the following formula:

Papaine 6 grains, milk, to nearly fill a champagne pint bottle, compressed yeast 20 grains, brown sugar 3 drachms. This does not keep very long.

Meat and malt koumiss would constitute a serviceable preparation in consumption.

Lacto-Somatose. A white, tasteless and odorless powder representing the albuminous principle of milk, combined with 5 percent. of tannin. Used as a food for children with intestinal troubles. Dose for children 1. to 2 teaspoonfuls daily.

Condensed Milk.

This is made by evaporating fresh milk in vacuo at a low temperature until the greater part of its water has been vaporized, and it is reduced to the consistence of a soft extract. It is only made in large establishments, and is usually put up in sealed cans. It is diluted with water and used as milk and may be used advantageously without dilution for making emulsions.

Powdered Milk. Milk is now prepared in the form of powder, by certain secret or patented processes. It is only necessary to dissolve a little of this powder in water to produce a very good imitation of milk.

Condensed Cream. This is prepared by vacuum evaporation in the same manner as condensed milk, and may be had put up in cans. This is, necessarily, evaporated at a lower temperature than milk, and when used, is diluted with water to the proper consistence.

Casein, a constituent of milk, which, in the presence of an acid, curdles or separates from the liquid portion into "curd," the fluid portion remaining being called "whey." The curd is gathered and pressed into cheese, a well-known article of food. Casein has been proposed for emulsifying oils in making medicinal emulsions, (as it emulsifies the fatty constituent of milk). Milk contains an average of about $2\frac{1}{2}$ percent. of dry casein.

Saccharated Casein containing 10 percent. of casein may be kept on hand for making emulsions. It may be prepared in this manner: To 1 gallon of milk, after standing for 10 to 12 hours, and removing the cream, add $1\frac{1}{2}$ fl.ounces of ammonia water and let stand 24 hours; remove all the scum from the top and add to the milk, acetic or other acids, to separate the casein from the whey. Then collect the casein, press it strongly, wash it with a weak solution of sodium bicarbonate to neutralize acid, press as dry as possible, add 1 ounce of powdered borax and mix with sufficient sugar to make the finished preparation contain one-tenth of its weight of dry casein; dry and reduce to powder. This may be used alone or mixed with an equal weight of gum arabic and used as an emulsifying agent.

Saccharum Lactis. Milk Sugar. $C_{12}H_{22}O_{11} \cdot H_2O$. When the casein and albuminous matter has been separated from milk, as in the process of making cheese, there remains a liquid called whey, which contains milk sugar in solution. This may be obtained by evaporating the whey, purifying the syrup obtained, and allowing the milk sugar to crystallize. The best milk sugar is obtained from goat's milk, but cow's milk yields a good quality when properly treated. (See *Saccharum Lactis*).

Uses. Milk sugar is used in pharmacy as a dilutant to powerful alkaloids and other medicines which are triturated with it to a very fine powder. It is used in making abstracts, powdered extracts, triturates, saccharated pepsins, and many other similar preparations. It is much harder and less soluble than other sugars.

Acidum Lacticum. Lactic Acid. $HC_3H_5O_3$. By standing, milk becomes sour, or rather, its milk sugar is converted by oxidation into lactic acid, which may be obtained from it by various processes. It is made, however, by manufacturing chemists from cane sugar by treating it with sulphuric acid until "inverted," then adding caustic soda and heating the mixture until it ceases to precipitate Fehling's solution, showing the absence of sugar. To this sulphuric acid is added, which crystallizes out. The liquid is then mixed with alcohol, allowed to precipitate, and one-half the alcoholic solution heated with zinc carbonate until effervescence ceases; the other half is then added, and, when cool, zinc lactate crystallizes out, which, when treated with hydrosulphuric acid yields zinc sulphide in crystals. Lactic acid remaining in solution. (See *Acidum Lacticum*).

Uses. The salts of lactic acid, with bases, are called lactates, for making which it is chiefly employed. It is also used in making some solutions, syrups, elixirs etc., and in medicine to aid digestion.

LACTOPHENIN. Lactyl-phenetidine.

This is a derivative phenacetine combined with lactic acid. It is a readily soluble, crystalline, bitter powder, having properties similar to phenacetine for which it is used as a substitute. Dose 8 to 15 grains.

LACTUCARIUM. U. S.

"The concrete milk-juice of *Lactuca virosa*, Linné (Fam. Compositæ)." <U. S.

This is obtained from the plants of several varieties of lettuce, and gathered while the plants are still in flower, by making incisions in the flowering stem and scraping off the thick juice that collects, massing it together and drying it to a mass of the consistence of a hard extract. It somewhat resembles opium in its effects and has been called lettuce opium. The dose is from 10 to 20 grains as an anodyne or hypnotic.

Average dose.—1 Gm. (15 grains).

Lactucin. This principle has been isolated from lactucarium and is supposed to be the active constituent of the drug. It is a sedative hypnotic, soluble in 70 parts of water and in alcohol. The dose is from 1 to 5 grains.

LAMELLÆ — DISCS.

These are official in the Br. P. as follows:

Lamellæ Atropinæ. Discs of Atropine. Discs of gelatin, with some glycerin, each weighing about $\frac{1}{50}$ grain (or 1.3 milligramme), and containing $\frac{1}{5000}$ (or 0.013 milligramme) of atropine sulphate.

Lamellæ Cocainæ. Discs of Cocaine. Discs of gelatin with some glycerin, each weighing about $\frac{1}{30}$ grain (or 2.17 milligrammes), and containing $\frac{1}{50}$ grain (or 1.3 milligrammes) of cocaine hydrochloride.

Lamellæ Homatropinæ. Discs of Homatropine. Discs of gelatin with some glycerin, each weighing about $\frac{1}{50}$ grain (or 1.3 milligrammes), and containing $\frac{1}{100}$ grain (or 0.65 milligramme) of homatropine hydrobromide.

Lamellæ Physostigminæ. Discs of Physostigmine. Discs of gelatin with some glycerin, each weighing about $\frac{1}{50}$ grain (or 1.3 milligrammes), and containing $\frac{1}{1000}$ grain (or 0.065 milligramme) of physostigmine sulphate.

LINIMENTA — LINIMENTS.

Liniments in pharmacy are solutions or liquid mixtures intended for external application, and generally applied by rubbing on the skin with friction, for reducing swellings, relieving pain etc. A great number of proprietary liniments are also recommended for internal use, as well as application. Under this heading only, the liniments which are official in the principal pharmacopœias will be noticed. Those popular as proprietary or semi-proprietary remedies will be found under other headings.

LINIMENTUM ACONITI. Br. Liniment of Aconite.

Aconite Root, in No. 40 powder,	20 ounces or 500 Gm.
Camphor,	1 ounce or 25 Gm.
Alcohol, (90%), a sufficient quantity.	

"Mix the powdered aconite root with 20 fl.ounces (or 500 Cc.) of the alcohol; set aside in a closed vessel for three days, agitating occasionally; transfer to a percolator; when the liquid ceases to pass continue the percolation with more of the alcohol, allowing the liquid to drop into a receiver containing the camphor, until 30 fl.ounces (or 750 Cc.) of the liniment are produced."<Br.

LINIMENTUM AMMONIÆ. U. S., Br.

Ammonia Liniment. Volatile Liniment.

The U. S. formula is:

Ammonia Water,	350 Cc. or 7 ounces
Cottonseed Oil,	600 Cc. or 12 ounces
Alcohol,	50 Cc. or 1 ounce

Shake them well together in a bottle. This should be freshly made when wanted for use. If drachms are substituted for ounces in the above, the product is 2½ ounces.<U. S.

The Br. P. formula is:

Solution of Ammonia,	1 fl.ounce or 25 Cc.
Almond Oil,	1 fl.ounce or 25 Cc.
Olive Oil,	2 fl.ounces or 50 Cc.

Shake them well together.

LINIMENTUM BELLADONNÆ. U. S., Br.

Belladonna Liniment.

The U. S. formula is:

Camphor,	50 Gm. or ½ ounce
Fluidextract of Belladonna, a sufficient quantity	
to make	1000 Cc. or 10 ounces

The camphor is to be dissolved in the fluidextract, 200 Cc. (or 2 ounces), and enough of the fluidextract added to make 1000 Cc. (or 10 ounces).<U. S.

The Br. P. formula is:

Liquid Extract of Belladonna,	10 fl.ounces or 250 Cc.
Camphor,	1 ounce or 25 Gm.
Distilled Water,	2 fl.ounces or 50 Cc.
Alcohol, (90%), a sufficient quantity.	

Dissolve the camphor in 6 fl.ounces (or 150 Cc.) of the alcohol, add the liquid extract of belladonna, the distilled water and sufficient of the alcohol to produce 20 fl.ounces (or 500 Cc.) of the liniment. Set aside for 24 hours, filter.<Br.

LINIMENTUM CALCIS. U. S., Br.

Lime Liniment. (Carron Oil).

The U. S. formula is:

Lime Water,	500 Cc. or 4 fl.ounces
Linseed Oil,	500 Cc. or 4 fl.ounces

Mix them by agitation.

The Br. P. formula is:

Solution of Lime,	2 fl.ounces or 50 Cc.
Olive Oil,	2 fl.ounces or 50 Cc.

Shake them together.

This is the well known "Carron Oil," thus named from the Carron Iron Works in Scotland, where it was much used for burns.

LINIMENTUM CAMPHORÆ. U. S., Br.

Camphor Liniment. Camphorated Oil. 

The U. S. formula is:

Camphor, in coarse powder,	200 Gm. or 2 ounces
Cotton Seed Oil,	800 Gm. or 8 ounces

"Introduce the camphor and cotton seed oil into a suitable flask, and apply gentle heat by means of a water-bath, loosely-stoppering the flask during the operation. Agitate from time to time until the camphor is dissolved." < U. S.

The Br. formula directs olive oil instead of cotton seed oil, but is otherwise the same.

LINIMENTUM CAMPHORÆ AMMONIATUM. Br.

Ammoniated Liniment of Camphor. Compound Liniment of Camphor.

Camphor,	2½ ounces	or	50 Gm.
Oil of Lavender,	1 fl.drachm	or	2.5 Cc.
Strong Solution of Ammonia,	5 fl.ounces	or	100 Cc.

Alcohol, (90%), a sufficient quantity.

"Dissolve the camphor and oil of lavender in 12 fl.ounces (or 240 Cc.) of the alcohol; add the strong solution of ammonia gradually, shaking them well together until, after adding sufficient of the alcohol to produce 20 fl.ounces (or 400 Cc.) of the liniment, a clear solution is formed." < Br.

It will be observed that this is quite different from the Liniment of Ammonia Compound of other pharmacopœias.

LINIMENTUM CANTHARIDIS. Cantharides Liniment.

This was formerly official in the U. S. P. but has been dismissed. The formula was:

Cantharides, in No. 60 powder,	15 parts or 2 ounces av.
Oil of Turpentine, to make	100 parts or 1 pint

Digest the cantharides with 100 parts (or 1 pint) of oil of turpentine in a closed vessel, by means of a water-bath, for three hours; then strain and add enough oil of turpentine through the strainer to make 100 parts (or 1 pint).

LINIMENTUM CHLOROFORMI. U. S., Br. Chloroform Liniment.

The U. S. formula is:

Chloroform,	300 Cc. or 3 fl.ounces
Soap Liniment,	700 Cc. or 7 fl.ounces
Mix them by agitation.	

The Br. P. formula is:

Chloroform,	2 fl.ounces or 50 Cc.
Liniment of Camphor,	2 fl.ounces or 50 Cc.

Mix them.

LINIMENTUM CROTONIS. Br. Liniment of Croton Oil.

Croton Oil,	1 fl.ounce or 20 Cc.
Oil of Cajuput,	3½ fl.ounces or 70 Cc.
Alcohol, (90%),	3½ fl.ounces or 70 Cc.

Mix them.

LINIMENTUM HYDRARGYRI. Br. Liniment of Mercury.

Ointment of Mercury,	1 ounce or 30 Gm.
Strong Solution of Ammonia,	160 minims or 10 Cc.
Liniment of Camphor,	a sufficient quantity.

"Add the strong solution of ammonia to sufficient of the liniment of camphor to produce 1½ fl.ounce (or 45 Cc.); triturate the ointment of mercury with sufficient of the liniment of camphor to produce 1½ fl.ounces (or 45 Cc.); mix the two liquids." < Br.

LINIMENTUM OPII. Br. Liniment of Opium.

Tincture of Opium,	2 fl.ounces or 50 Cc.
Liniment of Soap,	2 fl.ounces or 50 Cc.

Mix; set aside for a few days; filter. < Br.

LINIMENTUM OPII AMMONIATUM.

Ammoniated Liniment of Opium.

Liniment of Soap,	6 fl.ounces
Ammoniated Liniment of Camphor,	6 fl.ounces
Tincture of Opium,	6 fl.ounces
Liniment of Belladonna,	1 fl.ounce
Strong Solution of Ammonia,	1 fl.ounce

Mix, and after standing a week, filter quickly. < B. P. C.

LINIMENTUM PLUMBI SUBACETATIS.

Liniment of Subacetate of Lead.

This was formerly official but has been dismissed. As it may be called for the formula is given.

Solution Subacetate of Lead,	2 ounces av.
Cotton Seed Oil,	3 ounces av.

Mix them well together.

LINIMENTUM POTASII IODIDI CUM SAPONE. Br.

Liniment of Potassium Iodide with Soap.

"Curd soap, recently prepared and in shavings, 2 ounces (or 40 Gm.); potassium iodide 1½ ounces (or 30 Gm.), glycerin 1 fl.ounce (or 2.5 Cc.), distilled water 10 fl.ounces (or 200 Cc.).

Reduce the curd soap to fine shreds, mix it with the distilled water and glycerin in a porcelain dish on a water-bath; when the soap is

dissolved pour the liquid into a mortar in which the potassium iodide has previously been powdered; mix briskly by trituration; continue the trituration until the mixture is cold; set aside an hour; then rub well the oil of lemon into the cream-like product." < Br.

LINIMENTUM SAPONIS. U. S., Br.

Soap Liniment. Liniment of Soap. Liquid Opodeldoc.

The U. S. formula is:

Soap, dried and granulated,	60 Gm. or 1½ ounces
Camphor,	45 Gm. or 1⅞ ounces
Oil of Rosemary,	10 Cc. or ¼ ounce
Alcohol,	725 Cc. or 18⅞ ounces
Water, a sufficient quantity to make	1000 Cc. or 25 fl.ounces

"Add the soap to 200 Cc. (or 5 ounces) of boiling water, heat the mixture on a water-bath until a clear gelatinous mass results. Mix this, while yet warm, with 500 Cc. (or 12½ fl.ounces) of alcohol and stir until the solution is effected. Dissolve the camphor and oil of rosemary in 225 Cc. (or 5⅝ fl.ounces) of the alcohol, by agitation in a bottle; add this solution to the warm soap mixture; mix thoroughly, and, if necessary, add enough water to make the product measure 1000 Cc. (or 25 fl.ounces). Set it aside in a cool place for 24 hours, then filter." < U. S.

The Br. P. formula is:

Soft Soap,	2 ounces or 40 Gm.
Camphor,	1 ounce or 20 Gm.
Oil of Rosemary,	3 fl.ounces or 7.5 Cc.
Alcohol, (90%),	16 fl.ounces or 320 Cc.
Distilled Water,	4 fl.ounces or 80 Cc.

Dissolve the soap in the distilled water; dissolve the camphor and oil of rosemary in the alcohol; mix the solutions; set aside for one week; filter." < Br.

The Br. Linimentum Saponis is quite like the U. S., but is made with soft soap instead.

LINIMENTUM SAPONIS MOLLIS. U. S.

Liniment of Soft Soap.

Soft Soap,	650 Gm. or 6½ ounces
Oil of Lavender Flowers,	20 Cc. or 90 minims
Alcohol, a sufficient quantity to make	1000 Cc. or 10 fl.ounces

"Mix the oil of lavender flowers with 300 Cc. (or 3 fl.ounces) of alcohol, dissolve in this the soft soap by stirring or agitation, and set the solution aside for 24 hours. Then filter it through paper, adding sufficient alcohol to make the product measure 1000 Cc. (or 10 fl.ounces)." < U. S.

LINIMENTUM SINAPIS. Br. Liniment of Mustard.

Volatile Oil of Mustard,	1½ fl.drachms	or	2 Cc.
Castor Oil,	5 fl.drachms	or	7 Cc.
Camphor,	120 grains	or	3 Gm.
Alcohol, (90%),	4 fl.ounces	or	43 Cc.

"Dissolve the camphor in the alcohol; add the oil of mustard and castor oil; mix." < Br.

LINIMENTUM SINAPIS COMPOSITUM.**Compound Liniment of Mustard.**

This was official in the 7th revision of the U. S. P. but dismissed in the 8th.

Volatile Oil of Mustard,	30 Cc.	or	130 minims
Camphor,	60 Gm.	or	273 grains
Fluidextract Mezereum,	200 Cc.	or	2 fl.ounces
Castor Oil,	150 Cc.	or	1½ fl.ounces
Alcohol, to make	1000 Cc.	or	10 fl.ounces

The camphor is to be dissolved in 500 Cc. (or 5 ounces) of alcohol and the fluidextract added, then the oil of mustard and castor oil and enough alcohol to make the measure 1000 Cc. (or 10 fl.ounces).

LINIMENTUM TEREBINTHINÆ. U. S., Br.**Turpentine Liniment. U. S. Liniment of Turpentine. Br.**

The U. S. formula is:

Rosin Cerate,	650 Gm.	or	6½ ounces
Oil of Turpentine,	350 Gm.	or	3½ ounces

"Melt the rosin cerate in a capsule, on a water-bath, then add the oil of turpentine, and mix them thoroughly." < U. S.

The Br. formula is:

Soft Soap,	1½ ounces	or	37.5 Gm.
Distilled Water, q. s., or	5 fl.ounces	or	125 Cc.
Camphor,	1 ounce	or	25 Gm.
Oil of Turpentine,	13 fl.ounces	or	325 Cc.

"Melt the soft soap with 2 fl.ounces (or 5 Cc.) of the distilled water; dissolve the camphor in the oil of turpentine; gradually add the latter solution to the former, triturating until the mixture becomes a thick, creamy emulsion; lastly, mix with sufficient distilled water to produce 20 fl.ounces (or 500 Cc.)." < Br.

LINIMENTUM TEREBINTHINÆ ACETICUM. Br.**Liniment of Turpentine and Acetic Acid.**

Oil of Turpentine,	4 fl.ounces	or	100 Cc.
Glacial Acetic Acid,	1 ounce	or	25 Gm.
Liniment of Camphor, (Br.),	4 fl.ounces	or	100 Cc.

Mix them. < Br.

LIQUORES — SOLUTIONS.

Under this general classification a great variety of liquid preparations, widely dissimilar in class of substance, methods of making, characteristics, properties and strength are included.

The Liquores of the U. S. P. are chiefly aqueous solutions of chemical salts, while in other pharmacopœias many solutions of an entirely different nature are included.

A considerable number of solutions that are specially designed to be used in the formulas for elixirs and syrups in this work, will be found under the heading Solutions, which see.

LIQUOR ACIDI ARSENOSI. U. S.

Solution of Arsenous Acid.

"An aqueous solution, which should contain Arsenous Acid corresponding in amount to 1 percent. of arsenic trioxide [$\text{As}_2\text{O}_3=196.44$]." <U. S.

Arsenic Trioxide,	10 Gm. or ¼ ounce
Diluted Hydrochloric Acid,	50 Gm. or 1¼ ounces
Distilled Water, sufficient to make	1000 Gm. or 25 ounces

"Mix the diluted hydrochloric acid with 250 Gm. (or 6¼ ounces) of distilled water, in a tared porcelain dish, add the arsenic trioxide and boil the mixture until the arsenic trioxide is dissolved. Then add enough distilled water to make the product weight 1000 Gm. (or 25 ounces). Filter through paper." <U. S.

Average dose.—0.2 Cc. (3 minims).

Liquor Arsenici Hydrochloricus. Hydrochloric Solution of Arsenic. Br. Arsenious anhydride, in powder, $87\frac{1}{2}$ grains (or 10 Gm.); hydrochloric acid, 2 fl.drachms (or 12.5 Cc.); distilled water, a sufficient quantity. Make in the same manner as the U. S. to produce 20 fl.ounces (or 1000 Cc.) of the solution. <Br.

LIQUOR ACIDI CHROMICI. Br. Solution of Chromic Acid.

"An aqueous solution containing the equivalent of 25% of chromic anhydride, CrO_3 ; or 29.5% of chromic acid regarded as H_2CrO_4 ." <Br.

Chromic Anhydride,	1 ounce or 25 Gm.
Distilled Water,	3 fl.ounces or 75 Cc.

Dissolve. Used as a caustic.

LIQUOR AMMONIÆ. Br. Solution of Ammonia.

Aqua Ammonia. U. S. Ammonia Water.

"An aqueous solution containing 10% by weight of ammonia, NH_3 ." <Br.

Strong Solution of Ammonia,	20 fl.ounces or 500 Cc.
Distilled Water,	40 fl.ounces or 1000 Cc.

Mix. Sp. gr. 0.959. It represents 10% of ammonia gas.

LIQUOR AMMONIÆ FORTIS. Br.**Strong Solution of Ammonia.****Aqua Ammonia Fortior. Stronger Ammonia Water. U. S.**

"An aqueous solution containing 32.5 percent., by weight, of ammonia, NH_3 . It may be obtained by heating a mixture of ammonium chloride and slaked lime, and passing the resulting ammonia into distilled water." < Br.

The U. S. preparation is only 28 percent. of ammonia.

LIQUOR AMMONII ACETATIS. U. S., Br.**Solution of Ammonium Acetate.**

"An aqueous solution, which should contain not less than 7 percent. of Ammonium Acetate [$\text{CH}_3\cdot\text{COONH}_4=76.51$], with small amounts of acetic and carbonic acids." < U. S.

Ammonium Carbonate, 5 Gm. or $\frac{1}{2}$ ounce

Diluted Acetic Acid, 100 Cc. or 10 fl.ounces

"Add the ammonium carbonate (which should be in translucent pieces, free from white pulverent bicarbonate) gradually to the cold diluted acetic acid, and stir until dissolved. This preparation should be freshly made when wanted." < U. S.

Average dose.—16 Cc. (4 fl.drachms).

The Br. formula is:

Ammonium Carbonate, 1 ounce or 50 Gm.

Acetic Acid,

Distilled Water, of each, a sufficient quantity.

"Dissolve the ammonium carbonate in 10 times its weight of distilled water; neutralize with acetic acid; add sufficient distilled water to produce 20 fl.ounces (or 1000 Cc.) of the solution." < Br.

Dose, 2 to 6 fl.drachms.

LIQUOR AMMONII CITRATIS. Br.**Solution of Ammonium Citrate.**

Ammonium Carbonate, $1\frac{3}{4}$ ounces or 87.5 Gm.

Citric Acid, $2\frac{1}{2}$ ounces or 125 Gm.

Distilled Water, a sufficient quantity.

"Dissolve the citric acid in 5 times its weight of distilled water, neutralize with ammonium carbonate, add sufficient distilled water to produce 20 fl.ounces (or 100 Cc.). Dose, 2 to 6 fl.drachms." < Br.

LIQUOR ANTISEPTICUS. U. S. Antiseptic Solution.

This formula is doubtless intended to make a standard antiseptic solution similar to "Listerine" or other preparations of that class that have been widely used and for which no official formula has heretofore been given.

Boric Acid,	20.00 Gm. or 310	grains
Benzoic Acid,	1.00 Gm. or 16	grains
Thymol,	1.00 Gm. or 16	grains
Eucalyptol,	0.25 Cc. or 4	minims
Oil of Peppermint,	0.50 Cc. or 9	minims
Oil of Gaultheria,	0.25 Cc. or 4	minims
Oil of Thyme,	0.10 Cc. or 1½	minims
Alcohol,	250.00 Cc. or 8½	fl.ounces
Purified Talc,	20.00 Gm. or 310	grains
Water, sufficient to make	1000 Cc. or 34	fl.ounces

The boric acid is to be dissolved in 750 Cc. (or 25 fl.ounces) of water and the benzoic acid in 150 Cc. (or 5 fl.ounces) of alcohol, and the solution of boric acid poured into the solution of benzoic acid. The thymol is to be rubbed in a mortar with the eucalyptol and oils and the purified talc is to be thoroughly incorporated with them; then the mixture of the solutions is to be gradually added to the ingredients in the mortar, with constant trituration, and the mixture allowed to stand for 48 hours, with occasional agitation. It is then to be filtered and 100 Cc. (or 3½ fl.ounces) of alcohol added to the filtered liquid, with enough water to make the measure of the finished product 1000 Cc. (or 34 fl.ounces).

Average dose.—4 Cc. (1 fl.drachm).

LIQUOR ARSENICALIS. Br.

Arsenical Solution. Fowler's Solution.

The Br. P. preparation is:

Arsenious Anhydride,		
in powder,	87½ grains	or 10 Gm.
Potassium Carbonate,	87½ grains	or 10 Gm.
Comp. Tinct. Lavender,	5 fl.drachms	or 31¼ Cc.
Distilled Water, a sufficient quantity.		

"Heat the arsenious anhydride and potassium carbonate with 10 fl.ounces (or 500 Cc.) of distilled water in a 20 ounce (or 1 litre) flask until a clear solution is obtained; cool; add the compound tincture of lavender and sufficient distilled water to produce 20 ounces (or 1000 Cc.) of the solution. Dose, 2 to 8 minims." < Br.

110 minims contain 1 grain of arsenic anhydride; 100 Cc. contain 1 Gm.

LIQUOR ARSENI ET HYDRARGYRI IODIDI. U. S., Br.

Solution of Arsenous and Mercuric Iodides. [Donovan's Solution].

Solution of Arsenious and Mercuric Iodides. Br.

The U. S. P. formula is:

Arsenous Iodide,	10 Gm. or 91¼	grains
Red Mercuric Iodide,	10 Gm. or 91¼	grains
Distilled Water, to make	1000 Gm. or 20	fl.ounces

"Rub the arsenous iodide and red mercuric iodide together in a mortar, add 150 Cc. (or 3 ounces) of distilled water and continue the trituration until solution is effected. Filter the solution and pass sufficient distilled water through the filter to make the product weight 1000 Gm. (or 20 ounces)." < U. S.

The Br. formula is:

Arsenious Iodide, $87\frac{1}{2}$ grains or 10 Gm.

Mercuric Iodide, $87\frac{1}{2}$ grains or 10 Gm.

Distilled Water, a sufficient quantity.

"Triturate the arsenious iodide and the mercuric iodide with 3 or 4 fl.ounces (or 150 Cc.) of the distilled water until nearly all is dissolved; pass through a filter; wash the latter with sufficient distilled water to produce 1 Imp. pint (or 1000 Cc.) of the solution." < Br.

Under the title Donovan's Solution this has been extensively used as an alterative. Dose, 5 to 20 minims.

LIQUOR ATROPINÆ SULPHATIS. Br.

Solution of Atropine Sulphate.

Atropine sulphate, 1 Gm. or $17\frac{1}{2}$ grains

Salicylic Acid, 0.12 Gm. or 2 grains

Distilled Water, 100 Cc. or 4 fl.ounces

"Dissolve the atropine sulphate and salicylic acid in sufficient recently boiled and cooled distilled water to produce 4 fl.ounces (or 100 Cc.) of the solution." < Br. Dose, $\frac{1}{2}$ to 1 minim.

110 minims contain 1 grain of atropine sulphate, 100 Cc. contain 1 Gm.

LIQUOR BISMUTHI ET AMMONII CITRATIS. Br.

Solution of Bismuth and Ammonium Citrate. [Liquor Bismuthi].

In the Br. P. a formula is given by which a solution of bismuth and ammonium citrate is prepared. The process involves considerable manipulation and as the chemical salt may be purchased, and is considerably used in the U. S. in making elixirs in which a soluble bismuth salt is required, the formula is not repeated here. A formula is given under "Solutions" which will answer the purpose and is much more readily prepared than the Br. P. formula.

A fl.drachm of this Br. P. solution contains an amount of bismuth equivalent to about 3 grains, or 1 Cc., the equivalent of 0.05 Gm. of bismuth oxide.

LIQUOR CALCIS. U. S., Br. Solution of Lime.

Solution of Calcium Hydroxide. Lime Water.

"A saturated solution, which should contain not less than 0.14 per cent. of pure Calcium Hydroxide [$\text{Ca}(\text{OH})_2=73.56$]. The percentage of Calcium Hydroxide varies with the temperature at which the sat-

urated solution is prepared, being about 0.17 percent. at 15°C. (59°F.), the percentage diminishes as the temperature rises." <U. S.

The U. S. P. formula is:

Lime, 12 Gm. or 1 ounce

Distilled Water, a sufficient quantity.

"Slake the lime by the very gradual addition of 400 Cc. (or 34 fl. ounces) of distilled water, and agitate occasionally during half an hour. Allow the suspended particles to subside, decant the supernatant liquid and reject it. Then add to the residue 3600 Cc. (or 300 ounces) of distilled water and agitate thoroughly, let the mixture stand for 24 hours, agitate again, then let the coarser particles of solid matter subside, and pour the liquid, holding the undissolved calcium hydroxide in suspension, into a glass-stoppered bottle. From time to time shake the bottle, so as to keep the solution saturated.

Pour off the clear liquid when required for use." <U. S.

Average dose.—16 Cc. (4 fl.drachms).

The Br. P. formula is:

Calcium Hydroxide, 50 Gm. or 2 ounces

Distilled Water, a sufficient quantity.

"Wash the calcium hydroxide with distilled water until free from chloride; then shake it with 1 gallon (or 4 liters) of distilled water, in a stoppered green-glass bottle for two or three minutes; set aside for 12 hours. The clear solution may be drawn off with a siphon as is required for use, and should then be transferred to a green-glass bottle." <Br.

Dose, 1 to 4 fl.ounces.

LIQUOR CALCIS CHLORINATÆ. Br.

Solution of Chlorinated Lime.

Chlorinated Lime, 500 Gm. or 1 pound

Distilled Water, 5 liters or 1 gallon

"Mix; transfer the mixture to a stoppered bottle; set aside for 3 hours, shaking occasionally; filter through calico. Reserve the filtrate in a stoppered bottle in a cool, dark place." <Br.

The solution should yield, when fresh, about 3 percent. of available chlorine.

LIQUOR CALCIS SACCHARATUS. Br.

Saccharated Solution of Lime.

Calcium Hydroxide, 50 Gm. or 1 ounce

Refined Sugar, in powder, 100 Gm. or 2 ounces

Distilled Water, 1000 Cc. or 20 ounces

"Mix the calcium hydroxide with a solution of the refined sugar in the distilled water. Set aside in a stoppered green-glass bottle for a few hours, shaking occasionally; separate the clear solution with a

siphon, avoiding unnecessary exposure to air. Dose, 20 to 60 minims."Br.

This solution contains nearly 2 percent., by weight, of lime, CaO, or about 8 grains in 1 fl.ounce.

LIQUOR CALUMBÆ CONCENTRATUS. Br.

Concentrated Solution of Calumba.

Calumba Root, in No. 50 powder,	500 Gm. or 10 ounces
Alcohol, (90%),	225 Cc. or 4½ fl.ounces
Distilled Water,	1000 Cc. or 20 fl.ounces

"Macerate the calumba for 24 hours with 10 fl.ounces (or 500 Cc.) of distilled water; press strongly; again macerate the residue for 24 hours with 10 fl.ounces (or 500 Cc.) of distilled water; press strongly. Mix the expressed liquids, and heat for five minutes to 189°F. (82.2°C.). When cold add the alcohol; set aside; decant or filter, adding sufficient distilled water to produce 20 ounces (or 1000 Cc.) of the concentrated solution. Dose, ½ to 1 fl.drachm."<Br.

LIQUOR CAOUTCHOUC. Br. Solution of India Rubber.

India Rubber,	50 Gm. or 1 ounce
Benzol,	500 Cc. or 10 fl.ounces
Carbon Bisulphide,	500 Cc. or 10 fl.ounces

"Cut the India-rubber into fine shreds, and place it in a well-stoppered bottle containing the previously mixed benzol and carbon bisulphide. Set aside in a cool place, and agitate occasionally until solution is effected."<Br.

LIQUOR CHIRATÆ CONCENTRATUS. Br.

Concentrated Solution of Chiretta.

Chiretta, in No. 40 powder,	500 Gm. or 10 ounces
Alcohol, (20%),	1250 Cc. or 25 fl.ounces

"Moisten the chiretta with 5 fl.ounces (or 250 Cc.) of the alcohol; pack in a closed percolator; set aside for 3 days; percolate with the remaining alcohol, added in 10 equal portions at intervals of 12 hours; continue percolation with more alcohol until the product measures 20 ounces (or 1000 Cc.). Dose, ½ to 1 fl.drachm."<Br.

LIQUOR CHLORI COMPOSITUS. U. S.

Compound Solution of Chlorine. Chlorine Water.

[To replace Aqua Chlori, Pharm. 1890].

"An aqueous solution containing, when freshly prepared, about 0.4 percent. of chlorine [Cl=35.18], with some oxides of chlorine and potassium chloride."<U. S.

The formula is entirely changed and much simplified. It is now:

Potassium Chlorate, granulated,	5 Gm. or 77 grains
Hydrochloric Acid,	18 Cc. or 292 minims
Distilled Water to make	1000 Cc. or 33¾ fl.ounces

The hydrochloric acid is to be diluted with 20 Cc. (or 325 minims) of distilled water and added to the potassium chlorate contained in a flask of the capacity of about 2000 Cc. (or 68 fl.ounces). A stopper, perforated to admit a funnel of the capacity of about 100 Cc. (or 3½ ounces), and containing about 10 Gm. (or 154 grains) of purified cotton, well-wetted with cold water, is to be inserted in the flask. The flask is then to be placed on a water-bath, containing boiling water for a period of from 2 to 3 minutes; when the flask is completely filled with a greenish-yellow gas, remove it from the bath and add cold distilled water through the cotton in the funnel, in two separate portions of 500 Cc. (or 17 fl.ounces) each. After the addition of each separate portion of cold distilled water, stopper the flask securely, invert and thoroughly agitate the contents. The solution should be freshly made when wanted.

Average dose.—4 Cc. (1 fl.drachm). U. S.

LIQUOR CRESOLIS COMPOSITUS. U. S.

Compound Solution of Cresol.

This is doubtless designed to furnish a standard official preparation similar to "Creolin" which has been extensively used.

Cresol,	500 Gm. or 17½ oz. av. + 40 grains
Linseed Oil,	350 Gm. or 12 oz. av. + 151 grains
Potassium Hydroxide,	80 Gm. or 2 oz. av. + 360 grains
Water,	a sufficient quantity

To make 1000 Gm. or 35¼ ounces

The potassium hydroxide is to be dissolved in 50 Gm. (or 1¾ fl.ounces of water, in a tared dish, the linseed oil added and mixed thoroughly; the cresol is then to be added and the mixture stirred until a clear solution is produced, and finally sufficient water added to make the finished product weigh 1000 Gm. (or 35¼ fl.ounces).

LIQUOR CUSPARIÆ CONCENTRATUS. Br.

Concentrated Solution of Cusparia.

Cusparia Bark, in No. 40 powder, 500 Gm. or 10 ounces

Alcohol, (20%), 1250 Cc. or 25 fl.ounces

"Moisten the cusparia with 5 fl.ounces (or 250 Cc.) of the alcohol; pack in a closed percolator; set aside for 3 days; percolate with the remaining alcohol, added in ten equal portions at intervals of 12 hours; continue the percolation with more alcohol until the product measures 20 ounces (or 1000 Cc.). Dose ½ to 1 fl.drachm." < Br.

LIQUOR EPISPASTICUS. Br. Blistering Liquid.

Cantharides, in No. 40 powder, 500 Gm. or 10 ounces

Acetic Ether, a sufficient quantity.

"Mix the cantharides with 5 fl.ounces (or 250 Cc.) of acetic ether; pack in a percolator; at the expiration of 24 hours pour acetic ether

over the contents of the percolator; allow the solution to pass slowly through until 20 ounces (or 1000 Cc.) of the liquid is obtained." < Br.

LIQUOR ETHYL NITRITIS. Br. Solution of Ethyl Nitrite.

"A mixture of 95 parts by volume of absolute alcohol with 5 parts by volume of glycerin, containing, when freshly made, 3 percent., by weight, and even when long kept, not less than $2\frac{1}{2}$ percent. of ethyl nitrite. The ethyl nitrite is obtained by the interaction of alcohol, (90%), sodium nitrite, and diluted sulphuric acid, at a low temperature. Dose, 20 to 60 minims." < Br.

The above formula implies, but does not direct, the addition of 3 percent. Ethyl Nitrite to the mixture of absolute alcohol and glycerin. This may be most conveniently done by using ethyl nitrite, as it comes in sealed tubes—(now quite generally used for making Spirit of Nitrous Ether). As this contains 10 percent. of alcohol, about $\frac{1}{2}$ ounce of the ether would be required, with enough of the mixture of absolute alcohol and glycerin to make 16 fl.ounces.

LIQUOR FERRI ACETATIS. Br. Solution of Ferric Acetate.

Solution of Ferric Sulphate,	125 Cc. or $2\frac{1}{2}$ fl.ounces
Solution of Ammonia,	200 Cc. or 4 fl.ounces
Glacial Acetic Acid,	75 Cc. or $1\frac{1}{2}$ fl.ounces

"Mix the solution of ammonia with 1 pint (or 1 litre) of distilled water; gradually add to this the solution of ferric sulphate diluted with 1 pint (or 1 litre) of distilled water; stir well together, taking care that ammonia is, even finally, in slight excess, as indicated by the odor of the mixture; let the whole stand for 2 hours, stirring occasionally; transfer it to a calico filter; wash the precipitated ferric hydroxide with distilled water until free from sulphates; let drain; squeeze it to remove superfluous moisture; dissolve it in the glacial acetic acid; make the volume up to 1 pint (or 1 litre) with distilled water; allow any insoluble matter to subside; pour off the clear solution." < Br.

Dose, 5 to 15 minims.

The pint referred to in this formula is the Br. Imperial pint of 20 Imperial fl.ounces.

LIQUOR FERRI CHLORIDI. U. S. Solution of Ferric Chloride.

"An aqueous solution of ferric chloride, which should contain not less than 29 percent. of the anhydrous salt [$\text{FeCl}_3=161.04$], corresponding to 10 percent. of metallic iron." < U. S.

Iron, in the form of wire etc.,

	125 Gm. or 4 oz. av.+180 grains
Hydrochloric Acid,	680 Gm. or 23 oz. av.+431 grains
Nitric Acid,	

Distilled Water, each, a sufficient quantity

To make 1000 Cc. or $35\frac{1}{4}$ oz. av.

The iron wire is to be introduced into a flask having a capacity of about 2000 Cc. and a mixture of hydrochloric acid 420 Gm. (or 14 oz. av.+360 grains) with distilled water 250 Cc. (or 8½ fl.ounces) poured upon it, and heated upon a water-bath for not less than one hour and fifteen minutes, or until effervescence has ceased. The liquid is then to be boiled, filtered through paper and the rinsings of the iron wire and flask, with a little hot distilled water, passed through the filter. Hydrochloric acid, 220 Gm. (or 7 oz. av.+232 grains) is then to be added to the filtered liquid, and this mixture is to be slowly and gradually added in a stream, to nitric acid 64 Gm. (or 2 oz. av.+128 grains), contained in a capacious porcelain vessel, and the liquid gently warmed. After effervescence has ceased heat is to be applied by means of a sand-bath, stirring occasionally, until the liquid is free from nitric acid. If the solution has acquired a black color continue the addition of nitric acid, drop by drop, until red fumes are no longer evolved and the solution assumes a clear reddish-brown. Finally add the remaining 40 Gm. (or 1 oz. av.+180 grains) of hydrochloric acid and enough distilled water to make the solution weigh 1000 Gm. (or 35¼ oz. av.).

Average dose.—0.1 Cc. (1½ minims).

LIQUOR FERRI CITRATIS.

Solution of Ferric Citrate.

An aqueous solution of ferric citrate corresponding to about 7.5 percent, of metallic iron.<U. S. 7th revision, now dismissed.

Solution of Ferric Sulphate,	105 Gm. or 10½ ounces av.
Ammonia Water,	880 Cc. or 8¾ fl.ounces
Citric Acid,	300 Gm. or 3 ounces av.
Water, to make	1000 Gm. or 10 ounces av.

The ammonia water is to be mixed with 3000 Cc. (or 30 ounces) of cold water and the solution of ferric sulphate with 10000 Cc. (or 100 ounces) of cold water. The solutions are to be mixed and the precipitate washed and drained as directed in the formula for solution ferric acetate (anté). It is then to be transferred to a capsule, the citric acid added and the mixture heated on a water-bath to 60°C. (140°F.), stirring constantly until dissolved. The solution is then to be filtered and evaporated at the above mentioned temperature until it weighs 1000 Cc. (or 10 ounces).

This solution contains about 35.5 percent. of the anhydrous salt, equivalent to about 50 percent. of the scaled salt.

Uses. In pharmacy this solution is used for making several other scale salts and solutions of iron, and it is very convenient to use in solutions in place of the scale salt when directed, double the quantity by weight being required.

LIQUOR FERRI ET AMMONII ACETATIS. U. S.**Solution of Iron and Ammonium Acetate.**

The U. S. formula is:

Tincture of Ferric Chloride,	40 Cc. or	½ fl.ounce
Diluted Acetic Acid,	60 Cc. or	¾ fl.ounce
Solution Ammonium Acetate,	500 Cc. or	6¼ fl.ounces
Aromatic Elixir,	120 Cc. or	1½ fl.ounces
Glycerin,	120 Cc. or	1½ fl.ounces
Water, a sufficient quantity		

To make 1000 Cc. or 12½ fl.ounces

Add to the solution of ammonium acetate (which should not be alkaline), the diluted acetic acid, the tincture of ferric chloride, the aromatic elixir and the glycerin, successively, in the order named, and lastly enough water to make the product measure 1000 Cc. (or 12½ fl.ounces). This preparation should be freshly made when wanted.

Average dose.—6 Cc. (4 fl.drachms).

LIQUOR FERRI ET QUININÆ CITRATIS.

This solution was formerly official in the U. S. P. but has been dismissed.

Citrate of Iron and Ammonium,	6 parts or	1136 grains
Quinine, (alkaloid),	12 parts or	210 grains
Citric Acid,	28 parts or	490 grains
Alcohol,	30 parts or	12 fl.drachms
Distilled Water, to make	200 parts or	8 ounces av.

Dissolve the citrate of iron and ammonium in 200 parts (or 8 ounces) of distilled water contained in a weighed capsule, heat the solution to 60°C. (140°F.), on a water-bath, add the citric acid, and, when dissolved, add the quinine, stirring the mixture until a perfect solution has been obtained. Evaporate this to 160 parts (or 6 ounces av.), allow it to cool, add the alcohol, and finally, enough distilled water to make 200 parts (or 8 ounces av.).

Uses. This solution is just half the strength of the scaled salt and is very convenient to use in solutions instead of it when required. Double the quantity by weight must be used as is directed of the scaled salt. It may be used instead of the salt in making elixirs, syrups, wines etc. The dose is from 10 to 20 minims.

LIQUOR FERRI PERCHLORIDI. Br.**Solution of Ferric Chloride.**

This preparation of the Br. P. is of the same strength of ferric chloride as the tincture of ferric chloride, but an aqueous instead of an alcoholic menstruum is used.

Strong Solution of Ferric Chloride (Br. P.),

5 fl.ounces or 250 Cc.

Distilled Water, a sufficient quantity.

Mix the strong solution with sufficient distilled water to produce 20 fl.ounces (or 1000 Cc.) of this solution of ferric chloride.

Sp. gr. 1.11. Dose, 5 to 10 minims.

LIQUOR FERRI PERCHLORIDI FORTIS. Br.

Strong Solution of Ferric Chloride.

Iron, 4 ounces or 80 Gm.

Hydrochloric Acid, 20½ fl.ounces or 410 Cc.

Nitric Acid, 1½ fl.ounces or 30 Cc.

Distilled Water, a sufficient quantity.

This is prepared in the same manner as the U. S. P. Liquor Ferri Chloridi, but the product is 17½ fl.ounces (or 350 Cc.) of solution, making it stronger than the U. S. Sp. gr. about 1.42.

110 minims contain 22½ grains of iron; 100 Cc. contain 22.5 Gm.

Uses. This strong solution is used for preparing the Solution of Ferric Chloride, and the Tincture of Ferric Chloride of the Br. P.

LIQUOR FERRI PERNITRATIS. Br.

Iron, 1 ounce or 20 Gm.

Nitric Acid, 4½ fl.ounces or 90 Cc.

Distilled Water, a sufficient quantity.

Make by dissolving the iron with the nitric acid diluted with 4 volumes of distilled water, and diluting the solution to produce 30 fl.ounces (or 600 Cc.). Sp. gr. 1.107. 110 minims contain 3½ grains of iron; 100 Cc. contain 3.3 Gm. Dose, 5 to 15 minims. This contains double the quantity of iron of the former U. S. preparation.

Liquor Ferri Nitratis. Solution of Ferric Nitrate. This was official in the U. S. P. 7th revision, but was dismissed from the 8th. It was described as "An aqueous solution of ferric nitrate, $\text{Fe}_2(\text{NO}_2)_6$, containing about 6.2 percent. of the anhydrous salt, and corresponding to about 1.4 percent. of metallic iron." Sp. gr. about 1.050 at N. T.

LIQUOR FERRI PERSULPHATIS. Br.

Solution of Ferric Sulphate.

Ferrous Sulphate, 8 ounces or 400 Gm.

Sulphuric Acid, 6 fl.drachms or 37.5 Cc.

Nitric Acid, 6 fl.drachms or 37.5 Cc.

Distilled Water, a sufficient quantity.

This is prepared in about the same manner as the U. S. Liquor Ferri Subsulphatis following.

LIQUOR FERRI SUBSULPHATIS. U. S.**Solution of Ferric Subsulphate.**

"An aqueous solution of variable composition, containing an amount of basic ferric sulphate corresponding to not less than 13.57 percent. of metallic iron." < U. S.

Ferrous Sulphate, (crystals),	675 Gm. or 13.5 ounces
Sulphuric Acid,	65 Gm. or 1.3 ounces
Nitric Acid and Distilled Water, each,	
sufficient to make	1000 Gm. or 20 ounces

The sulphuric acid is to be added to 500 Cc. (or 10 ounces) of distilled water in a capacious porcelain dish, and the mixture heated by water-bath to nearly 100°C. (212°F.), and then 70 Gm. (or 1.25 ounces) of nitric acid added and well mixed with a glass rod. The ferrous sulphate, reduced to a coarse powder, is then to be added in 4 equal portions, one at a time, to the liquid, stirring after each addition until effervescence ceases. When all is dissolved nitric acid is to be added, a few drops at a time, until red fumes no longer rise when it is added. The solution is then to be boiled until it acquires a ruby-red color and is free from nitrous odors, and lastly, enough distilled water is to be added to make the weight 1000 Gm. (or 20 ounces). The product should be kept in well-stoppered bottles, in a moderately warm place, not under 22°C. (71.6°F.), protected from light.

This is also known as Solution Persulphate of Iron, but is stronger than the Br. preparation by that name.

Average dose.—0.2 Cc. (3 minims).

LIQUOR FERRI TERSULPHATIS. U. S.**Solution of Ferric Sulphate.**

"An aqueous solution, which should contain about 36 percent. of normal ferric sulphate [$\text{Fe}_2(\text{SO}_4)_3=397.05$], corresponding to not less than 10 percent. of metallic iron." < U. S.

Ferrous Sulphate, clear crystals,	500 Gm. or 10 ounces
Sulphuric Acid,	96 Gm. or 2 ounces
Nitric Acid and Distilled Water,	
of each, sufficient to make	1000 Gm. or 20 ounces

The sulphuric acid is to be added to 500 Cc. (or 10 ounces) of distilled water, in a capacious porcelain dish, and the mixture heated to nearly 100°C. (212°F.). Nitric acid, 56 Gm. (or 1½ ounces) is then to be added and well mixed, and the ferrous sulphate, coarsely powdered and divided into 4 portions, is then to be added to the mixture, a portion at a time, stirring with a glass rod after the addition of each portion, until effervescence ceases. After the iron salt is all dissolved, nitric acid, a few drops at a time, is to be added until red fumes are no longer evolved, and the solution is then to be boiled until it becomes

a reddish-brown color and is free from nitrous odor, and finally enough distilled water added to make the product weigh 1000 Gm. (or 20 ounces). Filter if necessary. Its sp. gr. is about 1.432 at 25°C. (77°F.).

Uses. In pharmacy this solution is used in making many other iron preparations, ferric hydrate being precipitated from it by ammonia. For medicinal use the subsulphate of iron is preferred.

LIQUOR FORMALDEHYDI. U. S. Solution of Formaldehyde.

"An aqueous solution, containing not less than 37 percent., by weight, of absolute Formaldehyde [$\text{H}\cdot\text{COOH}=29.79$], an oxidation product of methyl alcohol. It should be kept in well-stoppered bottles, in a cool place, protected from light." < U. S.

Formaldehyde is described under the title Formaldehydum, in alphabetical arrangement of subjects. The solution, as above, is what is generally known as Formaldehyde, (the real formaldehyde being a gas).

The solution is a clear, colorless liquid having a pungent odor and being irritant to the mucous membrane. Sp. gr. 1.075 to 1.078 at 25°C. (77°F). Miscible in all proportions with water, alcohol and glycerin.

An assay process for Formaldehyde is given in the U. S. P.

Solution of Formaldehyde is used in liquid preparations, generally much diluted, for preserving vegetable and animal specimens, and in embalming compounds. It may also be vaporized by boiling, the liberated gas acting as a germicide in a closed room or cabinet, but for this purpose the solid, paraformaldehyde is generally employed. This is described under Formaldehydum, which see.

LIQUOR GUTTA-PERCHA. Solution of Gutta-Percha.

This was formerly official in the U. S. and Br. Pharmacopœias, but has now been dismissed from both. It is still used occasionally.

Gutta-Percha, in thin slices,	9 parts
Commercial Chloroform, by weight,	91 parts
Lead Carbonate,	10 parts

Add the gutta-percha to 70 parts of chloroform contained in a bottle, cork it well, and shake it occasionally until the gutta-percha is dissolved. Then add the lead carbonate, previously mixed with the remainder of the chloroform, and having several times shaken the whole together at intervals of half an hour, set the mixture aside until the insoluble matters have subsided and the solution has become perfectly clear. Lastly decant the liquid and preserve it in small cork-stoppered vials.

Uses. This solution is used in pharmacy for mixing with mustard to make mustard paper, and may be used for other adhesive purposes, and as a cement or glue for rubber etc.

LIQUOR HAMAMELIDIS. Br. Solution of Hamamelis.

Fresh Hamamelis Leaves,	50 ounces or 1000 Gm.
Water,	100 ounces or 2000 Gm.
Alcohol, (90%),	10 fl.ounces or 200 Cc.

"Macerate in a still for 24 hours; then distil one half." < Br.

This is a distilled witch hazel, intended, evidently, to be similar to the distilled witch hazel or hamamelis of the market; but as that is prepared from the twigs and flower-buds of the hamamelis the flavor is quite different from the leaves only. We see no reason why this should be classed with the liquores, and refer readers to the formula for distilled extract of hamamelis among the Distillates.

LIQUOR HYDRARGYRI NITRATIS. U. S.**Solution of Mercuric Nitrate.**

"A liquid which should contain about 60 percent. of Mercuric Nitrate $[\text{Hg}(\text{NO}_2\text{O})_2=321.64]$, and about 11 percent. of free nitric acid." < U. S.

Red Mercuric Oxide,	40 Gm. or 4 ounces
Nitric Acid,	45 Gm. or $4\frac{1}{2}$ ounces
Distilled Water,	15 Gm. or $1\frac{1}{2}$ ounces

The nitric acid is to be mixed with the distilled water and the red mercuric oxide dissolved in the mixture. The sp. gr. of this salt is about 2.086 at 25°C. (77°F.).

LIQUOR HYDRARGYRI NITRATIS ACIDUS. Br.**Acid Solution of Mercuric Nitrate.**

Nitric Acid,	5 fl.ounces or 150 Cc.
Mercury,	4 ounces or 120 Gm.
Distilled Water,	$1\frac{1}{2}$ fl.ounces or 45 Cc.

"Mix the nitric acid with the distilled water in a flask, dissolve the mercury in the mixture without the application of heat, then boil gently for fifteen minutes; cool, and preserve the solution, which should weigh about three times the quantity of the mercury employed, in a stoppered bottle not exposed to the light." < Br.

LIQUOR HYDRARGYRI PERCHLORIDI. Br.**Solution of Mercuric Chloride.**

Mercuric Chloride,	10 grains or 1 Gm.
Distilled Water,	20 fl.ounces or 875 Cc.

Dissolve. Dose, $\frac{1}{2}$ to 1 fl.drachm. This solution contains $\frac{1}{16}$ grain mercuric chloride in 1 fl.drachm, or 0.114 Gm. in 100 Cc. < Br.

LIQUOR HYDROGENII PEROXIDI. Br.**Solution of Hydrogen Peroxide.**

"An aqueous solution of hydrogen peroxide, H_2O_2 , prepared by the interaction of water, barium peroxide, and a dilute mineral acid, at a temperature below 50°F. (10°C.)." < Br.

This is known in the U. S. P. as Aqua Hydrogenii Dioxidii, Solution of Hydrogen Dioxide, and is fully described and the formula for preparing it given under that title, which see. It is, however, more commonly known as "Hydrogen Peroxide" or "Peroxide of Hydrogen," and is generally furnished under that label in drug stores.

LIQUOR HYPOPHOSPHITUM COMPOSITUS.

Compound Solution of Hypophosphites.

Calcium Hypophosphite,	320 grains
Sodium Hypophosphite,	320 grains
Magnesium Hypophosphite,	160 grains
Strong Solution of Ferric Hypophosphite,	6 fl.ounces

"Exhaust the calcium, sodium and magnesium hypophosphites in 12 ounces of distilled water; add the solution of ferric hypophosphite. Filter, and make up to 20 fl.ounces by addition of distilled water.

Each fl.drachm contains about 2 grains each of sodium and calcium hypophosphite, 1 grain of magnesium hypophosphite, and $1\frac{1}{2}$ grains of ferric hypophosphite. Dose, $\frac{1}{2}$ to 2 fl.drachms." <B. P. C.

LIQUOR IODI COMPOSITUS. U. S.

Compound Solution of Iodine. [Lugol's Solution].

Iodine,	5 Gm. or 1 ounce
Potassium Iodide,	10 Gm. or 2 ounces
Distilled Water, to make	100 Gm. or 20 ounces

The iodine and potassium iodide are to be dissolved in sufficient distilled water to make the weight 100 Gm. (or 20 ounces). <U. S.

Observe that this solution contains no alcohol, while the Br. and Fr. are saturated alcoholic solutions.

LIQUOR IODI FORTIS. Br. Strong Solution of Iodine.

Iodine,	$1\frac{1}{4}$ ounces or 50 Gm.
Potassium Iodide,	$\frac{3}{4}$ ounce or 30 Gm.
Distilled Water,	$1\frac{1}{4}$ fl.ounces or 50 Cc.
Alcohol, (90%),	9 fl.ounces or 360 Cc.

Dissolve the potassium iodide and the iodine in the distilled water in a bottle; add the alcohol and shake.

LIQUOR KRAMERIÆ CONCENTRATUS. Br.

Concentrated Solution of Krameria.

Krameria Root, in No. 40 powder,	10 ounces or 500 Gm.
Alcohol, (20%),	25 fl.ounces or 1250 Cc.

"Moisten the krameria with 5 fl.ounces (or 250 Cc.) of the alcohol; pack in a closed percolator; set aside for 3 days; percolate with the remaining alcohol, added in 10 equal portions at intervals of 12 hours; continue percolation with more alcohol until the product measures 20 ounces (or 1000 Cc.). Dose, $\frac{1}{2}$ to 1 fl.drachm." <Br.

LIQUOR MAGNESII CARBONATIS. Br.**Solution of Magnesium Carbonate. [Fluid Magnesia].**

Magnesium Sulphate,	2	ounces or 40 Gm.
Sodium Carbonate,	2½	ounces or 50 Gm.
Distilled Water, a sufficient quantity.		

"Dissolve the two salts separately, each in 10 fl.ounces (or 200 Cc.) of the distilled water; heat the solution of magnesium sulphate to the boiling point; add to it the solution of sodium carbonate; boil them together until carbonic anhydride ceases to be evolved; collect the precipitated magnesium carbonate on a calico filter; wash it with distilled water until the filtrate is free from sulphate. Mix the washed precipitate with 20 fl.ounces (or 400 Cc.) of distilled water; place the mixture in a suitable apparatus; force into it pure washed carbonic anhydride, retained under a pressure of about 3 atmospheres for about 24 hours or longer; decant the solution, into which again pass carbonic anhydride. Keep the solution in bottles of convenient size, securely closed to prevent the escape of carbonic anhydride. Dose, 1 to 2 fl.ounces. This solution contains nearly 10 grains of the official magnesium carbonate in 1 fl.ounce, or about 2 Gm. in 100 Cc." <Br.

LIQUOR MAGNESII CITRATIS. U. S.**Solution of Magnesium Citrate.**

Magnesium Carbonate,	15.0	Gm. or 230 grains
Citric Acid,	33.0	Gm. or 506 grains
Syrup of Citric Acid,	60.0	Cc. or 2 fl.ounces
Potassium Bicarbonate,	2.5	Gm. or 38 grains
Water, a sufficient quantity.		

The citric acid is to be dissolved in 120 Cc. (or 4 fl.ounces) of water, and the magnesium carbonate, made fine by rubbing through a sieve, added and the mixture stirred until the magnesium carbonate is dissolved. The solution is then to be filtered into a strong bottle of the capacity of about 360 Cc. (or 12 fl.ounces) containing the syrup of citric acid; water is then to be added to nearly fill the bottle; and the potassium bicarbonate (in crystals) dropped in, and the bottle immediately corked and the cork secured with twine. It is then to be agitated occasionally until the potassium bicarbonate is dissolved. <U. S.

Prof. A. B. Stevens of the University of Michigan, and T. Palmer, a graduate of that institution, after a long series of experiments, recommended, and have published, the following formula as giving satisfactory results, and possessing indefinite keeping qualities:

Magnesium Carbonate,	200	grains or 13	Gm.
Sugar,	960	grains or 62	Gm.
Citric Acid,	415	grains or 26.5	Gm.

Oil of Lemon,	2 grains or	.128 Gm.
Potassium Bicarbonate,	30 grains or	2 Gm.

Dissolve the acid in 240 Cc. (or 8 fl.ounces) of water, add the magnesium carbonate, and when dissolved add the sugar which has previously been triturated with the oil of lemon. When dissolved, filter into a 335 Cc. (or 12 ounce) bottle and add water through the filter to make 335 Cc. (or 12 fl.ounces), then add the bicarbonate of potassium, cork and tie. This preparation is clear and sparkling, it is easily made, pleasant to the taste, and keeps well. Bottles opened three months after being made are just as good as when freshly made.

LIQUOR MORPHINÆ ACETATIS. Br.

Solution of Morphine Acetate.

Morphine Acetate,	17½ grains	or	1 Gm.
Diluted Acetic Acid,	38 minims	or	2 Cc.
Alcohol, (90%),	1 fl.ounce	or	25 Cc.
Distilled Water, a sufficient quantity.			

"Mix the alcohol with an equal volume of distilled water, adding the diluted acetic acid; dissolve the morphine acetate in the mixture; dilute with sufficient distilled water to produce 4 fl.ounces (or 100 Cc.) of the solution of morphine acetate. Dose, 10 to 60 minims.

110 minims contain 1 grain of morphine acetate. 100 Cc. contain 1 gramme." <Br.

LIQUOR MORPHINÆ HYDROCHLORIDI. Br.

Solution of Morphine Hydrochloride.

Diluted Hydrochloric Acid,	38 minims	or	2 Cc.
Morphine Hydrochloride,	17½ grains	or	1 Gm.
Alcohol, (90%),	1 fl.ounce	or	25 Cc.
Distilled Water, a sufficient quantity.			

"Mix the alcohol with an equal volume of distilled water, adding the diluted hydrochloric acid; dilute with sufficient distilled water to produce 4 fl.ounces (or 100 Cc.) of the solution of morphine hydrochloride. Dose, 10 to 60 minims.

110 minims contain 1 grain of morphine hydrochloride; 100 Cc. contain 1 Gm." <Br.

LIQUOR MORPHINÆ TARTRATIS. Br.

Solution of Morphine Tartrate.

Alcohol, ((90%)),	1 fl.ounce	or	25 Cc.
Morphine Tartrate,	17½ grains	or	1 Gm.
Distilled Water, a sufficient quantity.			

"Mix the alcohol with an equal volume of distilled water; dissolve the morphine tartrate in the mixture; add sufficient distilled water to

produce 4 fl.ounces (or 100 Cc.) of the solution. Dose, 10 to 60 minims." <Br.

110 minims of this solution contain 1 grain of morphine tartrate; 100 Cc. contain 1 Gm.

LIQUOR PANCREATIS. Br. Pancreatic Solution.

"A liquid preparation containing the digestive principles of the fresh pancreas of the pig. The preparation is most active when the animal from which it is obtained has been fed shortly before being killed."

"Five ounces (or 250 Gm.) of the pancreas, freed from fat and external membrane, and finely divided by trituration with washed sand or powdered pumice stone, should be digested in a closed vessel, in 20 fl.ounces (or 1000 Cc.) of alcohol (20%), for seven days, and then filtered." <Br.

The test for this solution is as follows: "If 2 Cc. of the solution, together with 0.2 Gm. of sodium bicarbonate and 20 Cc. of water, be added to 80 Cc. of milk, and the mixture kept at a temperature of 113°F. (45°C.) for one hour, coagulation should not longer occur on the addition of nitric acid."

LIQUOR PICIS CARBONIS. Br. Solution of Coal Tar.

Prepared Coal Tar, 4 ounces or 200 Gm.

Quillaia Bark, in No. 20 powder, 2 ounces or 100 Gm.

Alcohol, (90%), a sufficient quantity.

"Moisten the powdered quillaia bark with 1 fl.ounce (or 50 Cc.) of the alcohol, and complete the percolation process with the remainder of the alcohol as for tinctures, 20 fl.ounces (or 1000 Cc.) being produced. To the resulting percolate add the prepared coal tar, and digest the mixture at 120°F. (48.9°C.) for two days, occasionally stirring. Cool and decant, or filter." <Br.

This makes a preparation similar to Emulsion of Coal-Tar official in the Fr. P.

LIQUOR PLUMBI SUBACETATIS. U. S.

Solution of Lead Subacetate. Goulard's Extract.

"An aqueous liquid, which should contain in solution not less than 25 percent. of Lead Subacetate (approximately $\text{Pb}_2\text{O}(\text{CH}_3\cdot\text{COO})_2=543.74$)."

Lead Acetate, 180 Gm. or 6 oz. av. + 152 gr.

Lead Oxide, 110 Gm. or 3 oz. av. + 385 gr.

Distilled Water, sufficient

to make 1000 Gm. or 35¼ oz. av.

"To the finely powdered lead oxide contained in a porcelain dish of about 1 liter capacity, add slowly and in portions, with constant stir-

ring, the lead acetate which has been previously dissolved in 700 Cc. (or 24 fl.ounces) of boiling distilled water, and boil the liquid for half an hour, with occasional stirring. Finally, when cool, filter the solution, and add enough distilled water, which has been previously boiled and cooled, to make the finished product weigh 1000 Gm. (or 35¼ ounces av.). Keep the solution in well-stoppered bottles." <U. S.

Sp. gr. about 1.235 at 25°C. (77°F.). Care should be used in dispensing, to distinguish this strong solution from the diluted solution following.

LIQUOR PLUMBI SUBACETATIS DILUTUS. U. S., Br.

Diluted Solution of Lead Subacetate.

Goulard's Solution. Goulard's Water. (Br.).

"An aqueous liquid which should contain about 1 percent. of lead subacetate." <U. S.

Solution of Lead Subacetate, 40 Gm. or 1 oz. av. + 180 gr.

Distilled Water, sufficient

to make

1000 Gm. or 35¼ ounces av.

The solution of lead subacetate is to be mixed with enough distilled water, previously boiled and cooled, to make the product weigh 1000 Gm. (or 35¼ ounces av.). The solution should be kept in well-stoppered bottles.

The Br. formula is:

Strong Solution of Lead Subacetate, 2 fl.drachms or 5 Cc.

Alcohol, (90%),

2 fl.drachms or 5 Cc.

Distilled Water, a sufficient quantity.

"Mix the alcohol with 19½ fl.ounces (or 390 Cc.) of recently boiled and cooled distilled water; add the strong solution of lead subacetate and shake." <Br.

LIQUOR PLUMBI SUBACETATIS FORTIS. Br.

Strong Solution of Lead Subacetate. Syn. Goulard's Extract.

Lead Acetate, 5 ounces or 250 Gm.

Lead Oxide, in powder,

3½ ounces or 175 Gm.

Distilled Water; a sufficient quantity.

Boil the lead acetate and the lead oxide in 1 pint (or 1000 Cc.) of distilled water for half an hour, constantly stirring, and maintaining the volume of the liquid by occasional additions of distilled water; filter; when the liquid is cold add sufficient distilled water to produce 20 fl.ounces (or 1000 Cc.) of the strong solution." <Br.

The proportions of the ingredients in this formula are somewhat different, and it is considerable stronger than the U. S. Liquor Plumbi Subacetatis.

LIQUOR POTASSÆ. Br. Solution of Potash.

"An aqueous solution containing in 110 minims 6.2 grains, or in 1 fl.ounce 27 grains of potassium hydroxide, KOH. Dose 10 to 30 minims, freely diluted." <Br.

In the U. S. P. this solution is now known as *Liquor Potassii Hydroxidi*, which see.

LIQUOR POTASSII ARSEINITIS. U. S.**Solution of Potassium Arsenite.**

The supplementary title, **Fowler's Solution**, which this preparation has always borne is dismissed from the present revision.

"An aqueous solution, which should contain potassium arsenite corresponding in amount to 1 percent. of arsenic trioxide." <U. S.

Arsenic Trioxide, in fine powder,	10 Gm. or 154	grains
Potassium Bicarbonate,	20 Gm. or 303	grains
Compound Tincture of Lavender,	30 Gm. or 462	grains
Distilled Water, a sufficient quantity		

to make 1000 Gm. or 35¼ ounces av.

The arsenic trioxide and potassium bicarbonate are to be boiled together in a tared dish, with 100 Gm. (or 3⅔ fl.ounce) of distilled water until solution has been effected. Distilled water is then to be added to make the product weigh 970 Gm. (or 34 fl.ounces av.+95 grains) and, lastly, the compound tincture of lavender is to be added and the liquid filtered.

Average dose.—0.2 Cc. (3 minims).

The corresponding Br. P. preparation is now known under the title *Liquor Arsenicalis*, which see

LIQUOR POTASSII CITRATIS. U. S.**Solution of Potassium Citrate. [Mistura Potassii Citratis].**

"An aqueous liquid containing in solution not less than 8 percent. of anhydrous potassium citrate, $[C_3H_4(OH)(COOK)_3=304.2]$, with small amounts of citric and carbonic acids." <U. S.

Potassium Bicarbonate,	8 Gm. or 1	ounce
Citric Acid,	6 Gm. or ¾	ounce
Distilled Water, a sufficient quantity		

to make 100 Cc. or 12½ fl.ounces

The salts are each to be separately dissolved in 40 Cc. (or 6 ounces) of distilled water and the solutions separately filtered, washing the filters with enough distilled water to obtain, in each case, 50 Cc. or (6½ fl.ounces). When ready the solutions are to be mixed and when effervescence has nearly ceased, transferred to a bottle. This preparation should be freshly made when wanted for use. <U. S.

LIQUOR POTASSII HYDROXIDI. U. S.

Solution of Potassium Hydroxide. [Liquor Potassæ, Pharm. 1890].

"An aqueous solution containing about 5 percent. of potassium hydroxide [$\text{KOH}=55.74$]." <U. S.

Note the change in both the Latin and English titles. The formula is entirely changed and is now :

Potassium Hydroxide,	60 Gm. or 2	oz. av. + 51 gr.
Distilled Water,	940 Gm. or 33	oz. av. + 378 gr.
To make	1000 Gm. or 35¼	ounces av.

The potassium hydroxide is to be dissolved in the distilled water.

The Pharmacopœia directs that the potassium hydroxide used shall be of full strength and quality directed by the U. S. P., 85 percent.

The change in title adopted in the present revision from Liquor Potassa of the former revision may cause some confusion until it is well understood. The sp. gr. should be about 7.046 at 25°C. (77°F.).

Average dose.—1 Cc. (15 minims).

The corresponding Br. P. preparation is known by the old title, Liquor Potassæ, which see.

LIQUOR POTASSII PERMANGANATIS. Br.

Solution of Potassium Permanganate.

Potassium Permanganate,	87½ grains or 10 Gm.
Distilled Water, a sufficient quantity.	

"Dissolve the potassium permanganate in sufficient distilled water to produce 20 fl.ounces (or 1000 Cc.) of the solution. Dose, 2 to 4 grammes." <Br.

110 minims contain 1 grain of potassium permanganate; 100 Cc. contain 1 Gm.

LIQUOR QUASSIÆ CONCENTRATUS. Br.

Concentrated Solution of Quassia.

Quassia Wood, in No. 40 powder,	2 ounces or 100 Gm.
Alcohol, (20%),	22 fl.ounce or 1100 Cc.

"Mix the quassia with 2 fl.ounces (or 100 Cc.) of the alcohol; pack in a closed percolator; set aside for 3 days; percolate with the remaining alcohol added in 10 equal parts at intervals of 12 hours; continue percolation with more alcohol until the product measures 20 ounces (or 1000 Cc.). Dose, ½ to 1 fl.drachm." <Br.

LIQUOR RHEI CONCENTRATUS. Br.

Concentrated Solution of Rhubarb.

Rhubarb Root, in No. 5 powder,	10 ounces or 500 Gm.
Alcohol, (20%),	25 fl.ounces or 1250 Cc.

Moisten the rhubarb with 5 fl.ounces (or 250 Cc.) of alcohol, and make as the preceding. <Br.

LIQUOR SARSÆ COMPOSITUS CONCENTRATUS. Br.**Concentrated Compound Solution of Sarsaparilla.**

Sarsaparilla, cut transversely and bruised,	20	ounces	or	1000 Gm.
Sassafras Root, in shavings,	2	ounces	or	100 Gm.
Guaiaicum Wood, in shavings,	2	ounces	or	100 Gm.
Dried Liquorice Root, bruised,	2	ounces	or	100 Gm.
Mezereon Bark, cut small,	1	ounce	or	50 Gm.
Alcohol, (90%),	4½	fl.ounces	or	225 Cc.
Distilled Water, a sufficient quantity.				

"Infuse the sarsaparilla in three successive portions of 100 ounces (or 5 liters) of distilled water for 1 hour each, at 160°F. (71.1°C.). Boil the other solid ingredients with distilled water until exhausted. Rapidly concentrate the mixed infusion and decoction until, when cold, the liquid measures 16 fl.ounces (or 800 Cc.); add the alcohol; set aside for at least 14 days; filter. The product should measure 20 ounces (or 1000 Cc.). Dose, 2 to 8 fl.drachms." < Br.

LIQUOR SENEGÆ CONCENTRATUS. Br.**Concentrated Solution of Senega.**

Senega Root, in No. 20 powder, 10 ounces or 500 Gm.
A mixture of 2 parts of Alcohol, (20%), and
1 part of Alcohol, (45%), 25 fl.ounces or 1250 Cc.
Moisten the senega with 4 fl.ounces (or 200 Cc.) of the menstruum, and proceed as directed for Liquor Quassia to obtain 20 ounces (or 1000 Cc.). Dose, ½ to 1 fl.drachm. < Br.

LIQUOR SENNÆ CONCENTRATUS. Br.**Concentrated Solution of Senna.**

Senna, in No. 50 powder,	20	ounces	or	1000 Gm.
Tincture of Ginger,	2½	fl.ounces	or	125 Cc.
Alcohol, (90%),	2	fl.ounces	or	100 Cc.

Distilled Water, a sufficient quantity.

"Divide the senna into 3 equal portions, slightly moisten 1 portion with distilled water; pack in a percolator; set aside for 24 hours; pass distilled water through it until 5 fl.ounces (or 250 Cc.) are obtained. Slightly moisten the second portion of the senna with this liquid; pack in the percolator; set aside for 24 hours; percolate with the remainder of the liquid obtained from the first portion, and last with an additional 5 fl.ounces (or 250 Cc.) obtained by passing more distilled water through the first portion. Repeat the process with the third portion of the senna, and continue successive percolation through the three portions, until a quantity of 16 fl.ounces (or 800 Cc.) has been collected from the third percolator. Heat the liquid to 180°F. (82.2°C.) for five minutes; cool; add the alcohol and tincture of gin-

ger previously mixed; set aside for 7 days; filter. The product should measure 20 fl.ounces (or 1000 Cc.). Dose, $\frac{1}{2}$ to 1 fl.drachm." < Br.

LIQUOR SERPENTARIÆ CONCENTRATUS. Br.

Concentrated Solution of Serpentry.

Serpentry rhizome, in No.

40 powder, 10 ounces or 500 Gm.

Alcohol, (20%), 25 fl.ounces or 1250 Cc.

Moisten the serpentry with 5 fl.ounces (or 250 Cc.) of the alcohol, and proceed the same as directed for Liquor Quassia to obtain 20 ounces (or 1000 Cc.). Dose, $\frac{1}{2}$ to 1 fl.drachm. < Br.

LIQUOR SODÆ CHLORINATÆ. U. S., Br.

Solution of Chlorinated Soda. [Liquor Sodæ Chloratæ, Pharm. 1890].

Note the change in the Latin title, and that the supplementary title "Labarraque's Solution" is omitted from the present revision.

"An aqueous solution of several chlorine compounds of sodium, containing at least 2.4 percent., by weight, of available chlorine." < U. S.

Monohydrated Sodium Carbonate,

65 Gm. or 2 oz. av. + 162 gr.

Chlorinated Lime, 90 Gm. or 3 oz. av. + 77 gr.

Water, a sufficient quantity

to make 1000 Gm. or 35 $\frac{1}{4}$ ounces av.

The chlorinated lime (which should contain not less than 30 percent. of available chlorine) is to be triturated with 200 Cc. (or 6 $\frac{3}{4}$ fl.ounces) of water, the heavier particles allowed to subside and the thinner supernatant portion poured upon a filter. The residue is again triturated with 200 Cc. (or 6 $\frac{3}{4}$ fl.ounces) of water and the whole mixture poured upon the filter. When the liquid has drained off the filter its contents are to be washed with 100 Cc. (or 3 $\frac{1}{2}$ fl.ounces) of water. The monohydrated sodium carbonate is to be dissolved in 300 Cc. (or 10 fl.ounces) of hot water and this solution is to be added to the filtered liquid and thoroughly shaken. If it should become gelatinous, warm the vessel gently until the precipitate subsides; then transfer the mixture to a new filter and when the liquid has drained off wash the contents of the filter with enough water to make the product weigh 1000 Cc. (or 35 $\frac{1}{4}$ ounces av.). Keep the solution in well-stoppered bottles, protected from light, and in a cool place. Sp. gr. about 1.050 at 25°C. (77°F.). < U. S.

Average dose.—1 Cc. (15 minims).

The Br. P. formula is:

Chlorinated Lime,

16 ounces or 400 Gm.

Sodium Carbonate,

25 ounces or 600 Gm.

Distilled Water,

1 gallon or 4 liters

"Dissolve the sodium carbonate in one-quarter of the distilled water; thoroughly triturate the chlorinated lime with the remainder of the distilled water; mix the two liquids; filter." <Br.

LIQUOR SODII ARSENATIS. U. S., Br.

Solution of Sodium Arsenate.

"An aqueous solution, which should contain Sodium Arsenate corresponding in amount to not less than 1 percent. of exsiccated sodium arsenate." <U. S.

Exsiccated Sodium Arsenate, 1 Gm. or 15 grains

Distilled Water, sufficient to make 100 Gm. or $3\frac{3}{8}$ fl.ounces

"Dissolve the exsiccated sodium arsenate in a sufficient quantity of distilled water to make the product weigh 100 Gm. (or $3\frac{3}{8}$ fl.ounces)." <U. S.

Average dose.—0.2 Cc. (3 minims).

The Br. P. formula is:

Sodium Arsenate, recently rendered anhydrous,

17½ grains or 1 Gm.

Distilled Water, a sufficient quantity.

"Dissolve the anhydrous sodium arsenate in sufficient distilled water to produce 4 fl.ounces (or 100 Cc.) of the solution of sodium arsenate. Dose, 2 to 8 minims." <Br.

110 minims contain 1.77 grains of crystallized sodium arsenate, equivalent to 1 grain of the anhydrous salt; 100 Cc. contain 1.77 Gr. of the crystallized salt, equivalent to 1 Gm. of the anhydrous salt.

LIQUOR SODII ETHYLATIS. Br. Solution of Sodium Ethylate.

Sodium, clean and bright, 22 grains or 1 Gm.

Absolute Alcohol, 1 fl.ounce or 20 Cc.

"Cautiously dissolve the sodium in the absolute alcohol contained in a flask, the latter being kept cool by a stream of cold water.

This solution should be recently prepared. It contains 18 percent. of the solid substance, C_2H_5ONa ." <Br.

LIQUOR SODII HYDROXIDI. U. S.

Solution of Sodium Hydroxide.

"An aqueous solution containing about 5 percent. of Sodium Hydroxide [$NaOH=39.76$]." <U. S.

Sodium Hydroxide, 56 Gm. or 1 ounce av.

Distilled Water, 944 Gm. or 16½ ounces av.

Dissolve the hydroxide in the distilled water.

The Pharmacopœia directs that the sodium hydroxide used shall be of full strength and quality directed by the U. S. P., (90%).

This preparation should be kept in bottles made of green glass and provided with glass stoppers coated with paraffin or petrolatum.

Average dose.—1 Cc. (15 minims).

LIQUOR SODII PHOSPHATIS COMPOSITUS. U. S.**Compound Solution of Sodium Phosphate.**

Sodium Phosphate, uneffloresced crystals,

1000 Gm. or 10 ounces av.

Sodium Nitrate,

40 Gm. or 175 grains

Citric Acid,

130 Gm. or 569 grains

Distilled Water, a sufficient quantity

to make 1000 Cc. or 9 $\frac{5}{8}$ fl.ounces

The sodium phosphate and sodium nitrate are to be triturated in a mortar with the citric acid, until completely liquified, then sufficient distilled water is to be added to make the product measure 1000 Cc. (or 9 $\frac{5}{8}$ fl.ounces). The liquid is to be filtered and the solution kept in well-stoppered bottles, in a moderately warm place.

Average dose.—8 Cc. (2 fl.drachms).

LIQUOR SODII SILICATIS. Solution of Sodium Silicate.

This is commonly called "Soluble Glass," or "Water Glass." It is prepared by fusing together 1 part of fine sand (silica), with 2 parts of dried sodium carbonate, in an earthenware crucible, and when fused pouring upon a slab to cool. This is then to be powdered and boiled with water, which dissolves out the soluble portion. The liquid is then to be concentrated by evaporation and the crystals which are formed purified by dissolving them in water heated to 37.7°C. (100°F.), filtering, recrystallizing, and then again dissolving in hot water and concentrating until the liquid has sp. gr. 1.300 to 1.400 at N. T.

LIQUOR STRYCHNINÆ HYDROCHLORIDI. Br.**Solution of Strychnine Hydrochloride.**Strychnine Hydrochloride, 17 $\frac{1}{2}$ grains or 1 Gm.

Alcohol, (90%),

1 fl.ounce or 25 Cc.

Distilled Water, a sufficient quantity.

"Dissolve the strychnine hydrochloride in the alcohol mixed with distilled water to produce 4 fl.ounces (or 1 Cc.) of the solution of strychnine hydrochloride. Dose, 2 to 8 minims. 110 minims contain 1 grain of strychnine hydrochloride; 100 Cc. contain 1 Gm." <Br.

LIQUOR THYROIDEI. Br. Thyroid Solution.

"A liquid prepared from the fresh and healthy thyroid gland of the sheep." <Br.

"Remove the external fat and connective tissue from the thyroid glands taken from sheep immediately after killing; cut the glands across, and reject any that contain cysts, are hypertrophied, or otherwise abnormal. Count the healthy glands that remain; slice them and bruise them thoroughly in a mortar; for each entire gland (consisting of two lobes), add 34 minims (or 2 Cc.) of glycerin, and 34 minims

(or 2 Cc.) of a 0.5 percent. solution of phenol in distilled water; transfer the mixture, well stirred, to a flask and close the neck with a plug of cotton-wool; allow it to stand for 24 hours; then strain through linen, with strong pressure; add to the strained liquid sufficient of the 0.5 solution of phenol to make 100 minims (or 6 Cc.) of the solution for each gland used. Dose, 5 to 15 minims." < Br.

It must be freshly prepared and kept in well-stoppered, sterilized bottles. 100 minims (or 6 Cc.) represent one entire thyroid gland.

LIQUOR TRINITRINI. Br. Solution of Trinitrin.

Synonym—Solution of Nitroglycerin.

Trinitroglycerin of Commerce, 17½ grains or 1 Gm.

Alcohol, (90%), a sufficient quantity.

"Dissolve the trinitroglycerin in sufficient of the alcohol to produce 4 fl.ounces (or 100 Cc.) of the solution of trinitrin. Dose, ½ to 2 minims. 110 minims contain 1 grain of the trinitroglycerin; 100 Cc. contain 1 Gm." < Br.

Spiritus Glycerylis Nitratis, U. S. P., corresponds with this preparation.

LIQUOR ZINCI CHLORIDI. U. S., Br.

Solution of Zinc Chloride.

"An aqueous solution, containing about 50 percent., by weight, of Zinc Chloride, [$\text{ZnCl}_2=135.26$]." < U. S.

Zinc, granulated, 240 Gm. or 2 ounces

Hydrochloric Acid, 840 Gm. or 7 ounces

Nitric Acid, 12 Gm. or 1 ounce

Precipitated Zinc Carbonate, 12 Gm. or 1 ounce

Distilled Water, a sufficient quantity.

The zinc is to be put into a glass or porcelain vessel and 150 Cc. (or 1¼ ounces) of distilled water added. Hydrochloric acid is to be gradually added and the mixture digested until the acid is saturated; the solution is then to be poured off, the nitric acid added, and the solution evaporated to dryness, heating the mass to fusion at a temperature not exceeding 115°C. (239°F.). Let it cool and dissolve the solidified mass in a sufficient amount of distilled water to make the product weigh 100 Gm. (or 8¼ ounces). To this solution add the precipitated zinc carbonate, and let it set for 24 hours with occasional agitation, then set it aside until the precipitate has subsided, and finally separate the clear solution by decantation. The sp. gr. of this solution is 1.548 at 25°C. (77°F.).

The Br. P. formula is:

Granulated Zinc, 1 pound or 400 Gm.

Hydrochloric Acid, 44 fl.ounces or 1100 Cc.

Distilled Water, a sufficient quantity.

Make in the same manner as the U. S. formula, to produce 40 fl.ounces (or 1000 Cc.).

LITHIUM.

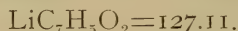
Symbol Li; Atomic weight (O=16) 6.94; Sp. gr. 0.589.

Lithium is the lightest of all the solid metals, and belongs to the alkaline group, being similar to potassium and sodium, although not so ready as they are to combine with oxygen. It was first obtained by Sir H. Davy, by exposing lithium hydrate in contact with mercury to galvanic action, and decomposing the amalgam thus formed by distilling off the mercury, leaving the metallic lithium. It is white and fuses at 180°C. (356°F.).

Lithium forms chemical combinations with the acids and the haloid elements, several of which are official, the salts being chiefly used to eliminate uric acid in kidney troubles and rheumatism.

Lithium and its salts are further described in the Chemical Section of this work, Part I.

The following are the official salts of lithium:

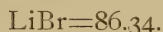
LITHII BENZOAS. U. S. Lithium Benzoate.

"It should contain not less than 98.5 percent. of pure Lithium Benzoate [$\text{C}_6\text{H}_5\cdot\text{COOLi}$], and should be kept in well-stoppered bottles." <U. S.

The U. S. P. does not give a formula for this salt, but it may be made conveniently by Shuttleworth's process: Lithium carbonate, 1 ounce av., is mixed in a capsule with 9 fl.ounces of water and heated, then $3\frac{3}{4}$ ounces of benzoic acid is added in small portions and the heat continued until the lithium carbonate is decomposed and effervescence has ceased. The solution is then filtered, concentrated by evaporation, and crystallized, or evaporated to dryness on a water bath. Soluble in 3 parts of water or in 13 parts of alcohol at 25°C. (77°F.).

Uses. This salt is a favorite remedy with physicians for gout and rheumatism.

Average dose.—1 Gm. (15 grains).

LITHII BROMIDUM. U. S. Lithium Bromide.

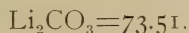
"It should contain, when well dried, not less than 97 percent. of pure Lithium Bromide, and should be kept in well-stoppered bottles." <U. S.

This is official in the U. S. and Fr. P., and may be made by dissolving lithium carbonate in hydrobromic acid, or by decomposing a solution of potassium bromide with a solution of lithium sulphate. It is also prepared in other ways, but is seldom made except by manufacturing chemists.

This is soluble in 0.6 part of water; freely soluble in alcohol. It is the most soluble of the lithium salts.

Uses. Lithium bromide is employed as a hypnotic, especially in rheumatic affections. It is one of the most efficient of the bromides. Average dose.—1 Gm. (15 grains).

LITHII CARBONAS. U. S., Br. Lithium Carbonate.



"It should contain not less than 98.5 percent. of pure Lithium Carbonate $[\text{CO}(\text{OLi})_2]$, and should be kept in well-stoppered bottles." <U. S.

"Lithium Carbonate, LiCO_3 , is obtained from native silicates of lithium." <Br.

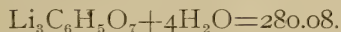
This may be most readily prepared by decomposing a strong solution of lithium sulphate with a strong solution of ammonium carbonate, lithium carbonate being precipitated, which is washed with a little alcohol and dried. It resembles magnesium carbonate. In a commercial way it is prepared by fusing the mineral lepidolite with barium carbonate, barium sulphate and potassium sulphate, and then separating the potassium and lithium sulphates which rise as above.

Soluble in 75 parts of water at 25°C . (77°F .), and in 140 parts of boiling water, but insoluble in alcohol. Soluble in dilute acids with active effervescence.

Uses. This is used as a basis for preparing most of the lithium salts, and is given in doses of 2 to 8 grains, and used as an injection, suspended in mucilage water, for urinary calculi.

Average dose.—0.500 Gm.=500 milligrammes $\cdot 7\frac{1}{2}$ grains).

LITHII CITRAS. U. S., Br. Lithium Citrate.



"It should, when carefully dried, contain not less than 98.5 percent. of pure Lithium Citrate $[\text{C}_3\text{H}_4(\text{OH})(\text{COOLi})_3]$, and should be kept in well-stoppered bottles." <Br.

"Lithium citrate is prepared by saturating citric acid with lithium carbonate." <Br.

Lithium Carbonate,

50 grains

Citric Acid,

90 grains

Warm Distilled Water,

1 fl.ounce

Dissolve the citric acid in the water and add the lithium carbonate in successive portions, applying heat until effervescence ceases and a perfect solution is obtained. Evaporate by a steam or sand-bath until the product has a specific gravity of about 1.230, and set aside for crystals to form. Dry the crystals and preserve them in a stoppered bottle.

This is soluble in 2 parts of water, but nearly insoluble in alcohol.

Uses. Lithium citrate is a soluble salt, convenient for using in solutions etc. This salt has been extensively used during the past few years in the treatment of uric acid diathesis.

Average dose.—0.500 Gm.=500 milligrammes ($7\frac{1}{2}$ grains).

LITHII CITRAS EFFERVESCENS. U. S., Br.**Effervescent Lithium Citrate.**

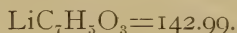
Lithium Citrate,	50 Gm. or	5	ounces
Sodium Bicarbonate,			
dried and powdered,	570 Gm. or	57	ounces
Tartaric Acid, dried and powdered,	300 Gm. or	30	ounces
Citric Acid,			
uneffloresced crystals,	195 Gm. or	19½	ounces
To make	1000 Gm. or	100	ounces

The citric acid is to be powdered and mixed intimately with the lithium citrate and tartaric acid; then the sodium bicarbonate is to be thoroughly incorporated with the mixture and the mixed powders are to be placed upon a plate of glass or in a suitable dish, in an oven heated between 93°C. and 104°C. (199.4°F. and 219.2°F.), and when the mixture by the aid of careful manipulation with a wooden spatula, has acquired a moist consistence, it is to be rubbed through a No. 6 tinned iron sieve, and the granules dried at a temperature not exceeding 54°C. (129.2°F.). The product should be kept in well-stoppered bottles. <U. S.

Average dose.—8 Gm. (120 grains).

The Br. P. formula is: Sodium bicarbonate, in powder, 58 ounces (or 580 Gm.); tartaric acid, in powder, 31 ounces (or 310 Gm.); citric acid, in powder, 21 ounces (or 210 Gm.); lithium citrate, 5 ounces (or 50 Gm.). Mix the lithium citrate with the citric acid, then add the tartaric acid, and, lastly, the sodium bicarbonate, triturating thoroughly. Place the whole in a dish or pan of suitable form and heat to between 200° and 220°F. (93.3° and 104.4°C.). When the mixture by the aid of careful manipulation has assumed a granular character, separate it by means of suitable sieves, into granules of uniform and convenient size. Dry the granules at a temperature not exceeding 130°F. (54.4°C.). The product should weigh about 100 ounces (or 1000 Gm.). The dose is 60 to 120 grains.

The required quantity of this granular preparation is put into a part of a glass of water and drunk during effervescence.

LITHII SALICYLAS. U. S. Lithium Salicylate.

"It should contain not less than 98.5 percent. of pure Lithium Salicylate [$\text{C}_6\text{H}_4(\text{OH})\text{COOLi}$], and should be kept in well-stoppered bottles." <U. S.

This may be conveniently prepared by adding to 1 fl.ounce of water 60 grains of lithium carbonate, and then heating to boiling, and gradually adding 220 grains of salicylic acid, and continuing the heat until effervescence ceases. This deliquesces when exposed to moist air, and is very soluble in water and alcohol.

Uses. This is used for gout, rheumatism etc., in doses of 20 to 40 grains. It seems to be more effective than other salicylates for this use.

Average dose.—1 Gm. (15 grains).

Other Lithium Salts.

The foregoing official lithium salts are all that are used to any extent in medicine, but many more are known and sometimes called for. They are described in the Chemical Section, Part I.

LOTIONES — LOTIONS.

Lotions are preparations intended to be applied externally for various purposes, and consist of medicinal substances mixed with, dissolved or suspended in water, or other vehicles. A great number of lotions were formerly known and used in medicine, but since the introduction of the oleates and other like preparations, by which the medicinal ingredients are more effectively applied, they have mostly gone out of use. The two formulas given are official in the Br. P. Many others will be found in other departments in this work.

LOTIO HYDRARGYRI FLAVA. Br.

Yellow Mercurial Lotion. Yellow Wash. [Aqua Phagendica].

Mercuric Chloride, 20 grains or 0.46 Gm.

Solution of Lime, 10 fl.ounces or 100 Cc.

Mix them. This is used as a wash for syphilitic sores, ulcers etc.

LOTIO HYDRARGYRI NIGRA. Br.

Black Mercurial Lotion. Black Wash. [Lotio Nigra].

Mercurous Chloride, 30 grains or 0.685 Gm.

Glycerin, $\frac{1}{2}$ fl.ounce or 5 Cc.

Mucilage of Tragacanth, $1\frac{1}{4}$ fl.ounces or 12.5 Cc.

Solution of Lime, a sufficient quantity.

“Triturate the mercurous chloride with the glycerin and mucilage of tragacanth; transfer it to a bottle; add 2 fl.ounces (or 20 Cc.) of the solution of lime; shake well; add sufficient solution of lime to produce 10 fl.ounces (or 100 Cc.) of the lotion.”<Br.

This wash is applied on lint to syphilitic sores, ulcers etc., and is used as an injection for venereal diseases.

LYSOL. Mex. Lisol.

This is one of the newly invented germicides, obtained by saponifying cresols or tar. It is official only in the Mex. P., in which it is described as a liquid of the consistence of syrup, of a reddish-brown color, and having the odor of tar. When dissolved in water it produces a transparent liquid, and in this respect differs from creolin, which is a preparation of a similar nature. The following formulas are given for its preparation:

Linseed Oil,	100 parts
Oil of Tar,	100 parts
Solution of Potassa, (50%),	75 parts
Alcohol, (90%),	65 parts

Put all the substances into a retort and heat them together until the mass is of a homogeneous color and consistence.

For preparing lysol with resin the formula is as follows:

Rosin, in powder,	100 parts
Oil of Tar,	40 parts
Solution of Potassa, (36° Baumé),	70 parts
Alcohol,	70 parts

Liquify the rosin and the tar by the aid of heat, in a retort, and add the solution of potassa and alcohol, previously mixed.

A solution of 0.50 to 3% of lysol in water is used as a bactericide and germicide, also as a disinfectant.

MAGNESIUM.

Symbol Mg; Atomic weight (O=16) 24.32; Sp. gr. 1.743.

The metallic element magnesium was discovered by Sir H. Davy in 1808, but was not isolated in a sufficient quantity for examination until 1830, when Bussy examined it and established its characteristics. It resembles zinc in its general properties, but is classed with earthy metals, calcium, barium, strontium etc.

It may be obtained commercially by heating to redness a mixture of magnesium chloride, 6 parts, with fused sodium chloride, 1 part, calcium fluoride, 1 part and sodium, in slices, 1 part.

To prepare it commercially pure, requires particular manipulation. It is furnished for laboratory use in the form of ribbon, also in coarse or fine powder.

Magnesium in metallic form is used for producing the brilliant magnesium light, when acted upon by the oxy-hydrogen jet. It is the basis of all the magnesium salts, which resemble those of calcium and barium, and form an important portion of the crust of the earth.

Magnesium and its salts are more fully described in the Chemical Section of this work, Part I.

The salts of magnesium are considerably used in pharmacy and medicine. The following are the official salts of the U. S. and Br. P.

MAGNESIA LEVIS. Br. Light Magnesia.

Syn. Light Calcined Magnesia. Light Magnesium Oxide.

"Light Magnesium Oxide, MgO , is prepared by exposing light magnesium carbonate to a dull red heat."

"Characters.—A bulky white powder, differing from heavy magnesia only in its greater lightness, the volume corresponding to the same weight being to each other in the ratio of three and a half to

one." < Br.

Dose, 5 to 30 grains, for repeated administration; for a single administration, 30 to 60 grains.

In the U. S. P. this is now known as "Magnesii Oxidum," which see.

MAGNESIA PONDEROSA. Br. Heavy Magnesia.

Syn. Heavy Calcined Magnesia. Heavy Magnesium Oxide.

"Heavy Magnesium Oxide, MgO , is prepared by exposing heavy magnesium carbonate to a dull red heat."

"Characters and tests.—A white powder, insoluble in water, but readily dissolved by acids, the solution affording the reactions characteristic of magnesium. It should yield no characteristic reaction with the tests for iron, aluminum, calcium or carbonates, and only the slightest reactions with the tests for chlorides or sulphates. When heated to dull redness it should lose little or no weight." < Br.

Dose, 5 to 30 grains for repeated administration; for a single administration, 30 to 60 grains.

Husband's Magnesia and **Henry's Magnesia** are simply heavy magnesia put up in proprietary form and sold at a fancy price.

In the U. S. P. this is now known as "Magnesii Oxidum Ponderosum," which see.

MAGNESII CARBONAS. U. S., Br. Magnesium Carbonate.

Approximately $(\text{MgCO}_3)_4 \cdot \text{Mg}(\text{OH})_2 + 5\text{H}_2\text{O} = 482.26$. U. S.

$3(\text{MgCO}_3) \cdot \text{Mg}(\text{HO})_2, 4\text{H}_2\text{O}$. Br.

The U. S. P. gives no formula for this preparation, but the Br. P. gives two processes, one for making Magnesii Carbonas Levis, or light magnesium carbonate, and the other for making Magnesii Carbonas Ponderosa, or heavy magnesium carbonate; the latter being generally used in pharmacy.

The proportions of both are the same, varying only in the manner of making.

Average dose.—3 Gm. (45 grains).

Light Magnesium Carbonate. Br.

Magnesium Sulphate, 10 ounces or 125 Gm.

Sodium Carbonate, 12 ounces or 150 Gm.

Distilled Water, a sufficient quantity.

Dissolve the magnesium sulphate and sodium carbonate each in half a gallon (or 1 liter) of cold distilled water; mix the two solutions; boil the mixture for 15 minutes; transfer the precipitate to a calico filter; pour upon it boiling distilled water until the washings are free from sulphates; dry at a temperature not exceeding 212°F . (100°C .).

Heavy Magnesium Carbonate.

Magnesium Sulphate, 10 ounces or 125 Gm.

Sodium Carbonate, 12 ounces or 150 Gm.

Distilled Water, boiling, a sufficient quantity.

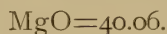
Dissolve the magnesium sulphate and the sodium carbonate each in a pint (or 250 Cc.) of the distilled water; mix the solutions, and evaporate to dryness; digest the residue for half an hour with 2 pints (or 500 Cc.) of the distilled water, and having collected the insoluble matter on a calico filter, wash it repeatedly with distilled water, until the washings are free from sulphates; dry the product at a temperature not exceeding 212°F. (100°C.).

Uses. Magnesium carbonate is extensively used in pharmacy for various purposes, and in medicine is employed as an antacid and laxative, in doses of 20 to 60 grains or more. It is a familiar household remedy for "heart-burn," and is considerably used as a toilet powder, and in tooth powders etc.

Milk of Magnesia. By omitting to dry the precipitate as above prepared, and suspending it instead in a little water as will answer the purpose, milk of magnesia is produced. A proprietary article by this name has had a popular sale.

MAGNESII OXIDUM. U. S. Magnesium Oxide.

Magnesia. Calcined Magnesia.



"It should contain, after ignition, not less than 96 percent. of pure Magnesium Oxide. It should be kept in well-closed vessels." <U. S.

The same as Magnesia Levis of the Br. P.

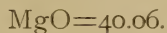
This is a very light, white, bulky powder, without odor and but little taste. It is nearly insoluble in water, insoluble in alcohol, but soluble with dilute acids, forming magnesium salts.

Commercially it is known as "Calcined Magnesia," and in pharmacy it is used for making some preparations. In medicine it is given as an antacid and laxative.

Average dose.—2 Gm. (30 grains).

MAGNESII OXIDUM PONDEROSUM. U. S.

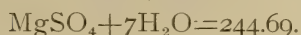
Heavy Magnesium Oxide. Heavy Magnesia.



Chemically this is the same as Magnesia Oxidum of the U. S. P., or Magnesia Levis of the Br. P., but by its method of preparation the same bulk is about 3½ times heavier. It differs from the light magnesium oxide in not readily uniting with water to form a gelatinous hydroxide.

The uses of this preparation are the same as of the light magnesia, but being less bulky it is more convenient for medicinal use.

Average dose.—2 Gm. (30 grains).

MAGNESII SULPHAS. U. S., Br. Magnesium Sulphate.**Epsom Salt.**

"It should contain not less than 99.7 percent. of pure Magnesium Sulphate [$\text{SO}_4 \cdot \text{O}_2\text{Mg} + 7\text{H}_2\text{O}$], and should be kept in well-closed vessels." < U. S.

"Magnesium Sulphate may be prepared by the interaction of the native magnesium carbonates and diluted sulphuric acid; or by purifying the native sulphate." < Br.

This is prepared commercially by treating the earthy silicious magnesium hydrate with sulphuric acid. The mass is then dried and calcined at a red heat, to convert ferrous sulphate into red oxide of iron. It is then dissolved in water and calcium sulphide added to separate any portion of iron remaining, and at last dissolved again and crystallized to make the Epsom salt of commerce. For laboratory experiments magnesium carbonate may be dissolved to saturation in sulphuric acid, the solution concentrated by evaporation and crystallized. It is very soluble in water, but insoluble in alcohol.

Uses. Magnesium sulphate is the commercial basis of most of the magnesium salts. It is extensively used as a medicine, being familiarly known as "Salts." It acts as a cathartic in doses of 1 ounce, and is used in smaller doses as a laxative and refrigerant.

Average dose.—16 Gm. (240 grains).

MAGNESII SULPHAS EFFERVESCENS. U. S., Br.**Effervescent Magnesium Sulphate.**

The U. S. P. formula is:

Magnesium Sulphate, uneffloresced	
crystals,	500 Gm. or 50 ounces
Sodium Bicarbonate,	
dried and powdered,	403 Gm. or 40 oz.+131 grains
Tartaric Acid,	
dried and powdered,	211 Gm. or 21 oz.+44 grains
Citric Acid, uneffloresced	
crystals,	136 Gm. or 13 oz.+262 grains
To make about	1000 Gm. or 100 ounces

The magnesium sulphate is to be dried on a water-bath until it ceases to lose weight, then, after powdering the dry salt it is to be mixed intimately with the citric and tartaric acids and incorporated thoroughly with the sodium bicarbonate. The mixed powders are then to be placed on a glass plate or in a suitable dish, in an oven heated to between 93° and 104°C. (199.4° and 219.2°F.), and when the mixture has acquired a moist consistence by the aid of manipulation with a wooden spatula, rub it through a No. 6 tinned-iron sieve,

and dry the granules at a temperature not exceeding 54°C . (129.2°F .). Keep the product in well-stoppered bottles.

Average dose.—16 Gm. (240 grains).

The Br. formula is:

Magnesium Sulphate, crystals,	50	ounces or 500 Gm.
Sodium Bicarbonate, powder,	36	ounces or 360 Gm.
Tartaric Acid, in powder,	19	ounces or 190 Gm.
Citric Acid, in powder,	12½	ounces or 125 Gm.
Refined Sugar, powder,	10½	ounces or 105 Gm.

“Dry the magnesium sulphate at about 130°F . (54.4°C .), until it has lost 23 percent. of its weight; powder the product; mix it with the fine sugar and then with the other ingredients. Place the mixture in a dish or pan of suitable form heated to between 200° and 220°F . (93.3°C . and 104.4°C .). When the mixture, by aid of careful manipulation, has assumed a granular character, separate it into granules of uniform and convenient size by means of suitable sieves. Dry the granules at a temperature not exceeding 130°F . (54.4°C .). The product should weigh about 100 ounces (or 1000 Gm.). Dose, 60 to 240 grains for repeated administration; for a single administration, $\frac{1}{4}$ to 1 ounce.” < Br.

The required quantity of this granular preparation is put into part of a glass of water and drunk during effervescence.

Other Magnesium Salts.

The foregoing official salts of magnesium are all that are much used in pharmacy or medicine, but as it combines with most of the acids and non-metals, a great number of other preparations are known and are described in the Chemical Section, Part I.

MANGANESE.

Symbol Mn; Atomic weight (O=16) 54.93; Sp. gr. 7.13.

Manganese is a very hard, brittle metal, quite abundant in nature in the form of its black oxide. It is classed chemically with iron and chromium, its salts very much resembling those of iron. Metallic manganese is seldom seen except in the chemist's laboratory; its affinity for oxygen is so great that when powdered it decomposes water without the aid of heat, and it must be preserved in naphtha.

It forms compounds with the non-metallic elements, and unites with hydrogen and oxygen, forming manganic acid (H_2MnO_4), which is only known in its combinations with bases called Manganates. With oxygen it forms definitely five compounds, and two more are supposed to exist. The binoxide of manganese is much employed as a source of oxygen for manufacturing purposes, as in the production of chlorine for bleaching purposes, the melting of glass with the oxy-hydrogen jet etc. In pharmacy it is employed for the production of chlorine, potassium permanganate, and hydrogen peroxide. A few of

the manganese salts are employed in medicine as alteratives and tonics.

Manganese and its salts are more fully noticed in the Chemical Section, Part I.

The following are the official salts of manganese:

MANGANI DIOXIDUM PRÆCIPITATUM. U. S.

Precipitated Manganese Dioxide.

[To replace Mangani Dioxidum, Pharm. 1890].

"Chiefly Manganese Dioxide [$\text{MnO}_2=86.36$], with small amounts of other oxides of manganese, corresponding to not less than 80 percent. of manganese dioxide." <U. S.

Manganese Sulphate,	50 Gm. or 5½ ounces av.
Ammonia Water,	250 Cc. or 25 fl.ounces
Solution Hydrogen Dioxide,	250 Cc. or 25 fl.ounces
Distilled Water, a sufficient quantity.	

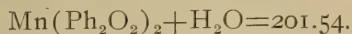
"The manganese sulphate is to be dissolved in distilled water 1000 Cc. (or 100 fl.ounces). The ammonia water is to be diluted with an equal volume of distilled water and mixed with the solution of hydrogen dioxide, which has also been diluted with an equal volume of distilled water. The mixture of the two solutions is to be poured slowly and with constant stirring into the solution of manganese sulphate and the mixture allowed to stand for 1 hour, stirring frequently. Then the supernatant clear liquid is to be decanted from the precipitate and the latter repeatedly washed by affusion with hot water, using 1000 Cc. (or about 100 fl.ounces) each time. Collect the precipitate on a plain filter, and continue the washing with hot distilled water until the washings no longer have an alkaline reaction upon red litmus paper, and produce no turbidity when mixed with barium chloride test solution. Allow the precipitate to drain, then dry it at 150°C. (302°F.)." <U. S.

It is insoluble in water or alcohol, but is acted upon by some acids when heated with them. When heated to a red heat it parts with a portion of its oxygen and is sometimes employed as a source of oxygen for laboratory experiments.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

This is intended for medicinal use. In the 7th revision of the U. S. P. commercial Manganese Dioxide, containing at least 66 percent. of the pure dioxide, was official. This is commonly known as "Black Oxide of Manganese," and is sufficiently pure for most purposes.

MANGANI HYPOPHOSPHIS. U. S.



"It should contain not less than 97 percent. of pure Manganous Hypophosphite [$\text{CPh}_2\text{O}\cdot\text{O})_2\text{Mn} + \text{H}_2\text{O}$], and should be kept in well-stoppered vials." <U. S.

This is a pink, crystalline powder, odorless and nearly tasteless, permanent in the air; soluble in 6.6 parts of water at 25°C. (77°F.), and in 6 parts of boiling water; almost insoluble in alcohol.

This salt is chiefly used as an ingredient of solutions or syrups of hypophosphites compound, in which it is represented about 8 grains in a fl.ounce. Being official in the U. S. P., it is considerably used in hypophosphite combinations.

Average dose.—0.200 Gm.=200 milligrammes (3 grains).

MANGANI SULPHAS. U. S. Manganese Sulphate.



"It should contain not less than 99.5 percent. of pure Manganous Sulphate [$\text{SO}_2 \cdot \text{O}_2\text{Mn} + 4\text{H}_2\text{O}$], and should be kept in well-stoppered bottles." <U. S.

This salt is in colorless or pale rose-colored crystals containing 4 molecules or 32.29 percent. of water of crystallization. When exposed to the air it is slightly efflorescent. It is soluble in about 0.7 part of water at 25°C. (77°F.), and in 0.53 part of boiling water; insoluble in alcohol.

Uses. This salt is generally used in making decomposition compounds of chemicals with manganese, and in medicine has similar uses as iron sulphate. In medicine it is given as a tonic and alterative, also is employed in the form of ointment, glycerite etc.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

Other Manganese Salts.

The foregoing are the U. S. official salts of manganese. Many other manganese salts are prepared and sometimes used in pharmacy and medicine. They are more fully described in the Chemical Section, Part I.

MASSÆ — MASSES.

Under this title the U. S. P. gives the formula for two preparations which are made and kept in the form of a pilular mass, and are frequently sold and dispensed in this form, but are also designed to be made up into pills or mixed with other substances for making pills. Under the title *Pilulæ* in the Br. P. quite a number of masses are included, see *Pilulæ*. The U. S. official formulæ are as follows:

MASSA FERRI CARBONATIS. U. S.

Mass of Ferrous Carbonate. [Vallet's Mass].

Ferrous Sulphate,	100 Gm. or	2	ounces av.
Monohydrated Sodium			
Carbonate,	46 Gm. or	402	grains
Clarified Honey,	38 Gm. or	$\frac{3}{4}$	ounce av.
Sugar, in coarse powder,	25 Gm. or	$\frac{1}{2}$	ounce av.
Distilled Water,			
Syrup, of each, a sufficient quantity.			

Dissolve the iron salt and sodium salt separately, each in 200 Cc. (or 1 pint) of boiling distilled water, and, having added 25 Cc. (or 3 fl.drachms) of syrup to the solution of iron salt, filter both solutions. Mix them when cold in a bottle just large enough to hold both solutions, and stop the bottle tightly and set aside so that the ferrous carbonate may subside. Pour off the supernatant liquid, and having mixed the syrup and distilled water in the proportion of 1 volume or $1\frac{1}{2}$ fl.drachms of syrup to 19 volumes (or 5 fl.ounces) of water, wash the precipitate until washings no longer have a saline taste. Drain the precipitate on a flannel cloth and express as much of the water as possible. Lastly, mix the precipitate immediately with the honey and sugar, and by means of a water-bath evaporate the mixture, stirring constantly until it is reduced to 100 Gm. (or 2 ounces av.). <U. S.

MASSA HYDRARGYRI. U. S. Mass of Mercury.

Blue Pill. Blue Mass.

Mercury,	33 Gm. or 510 grains
Glycyrrhiza, in No. 60 powder,	10 Gm. or 154 grains
Althæa, in No. 60 powder,	15 Gm. or 231 grains
Glycerin,	9 Gm. or 140 grains
Honey of Rose,	33 Gm. or 510 grains

The mercury is to be triturated with the honey of rose until it is extinguished and globules of mercury are no longer visible under a lens magnifying at least 10 diameters. The glycerin is then to be added, then the powders, gradually and the trituration continued until the mass is homogeneous. <U. S.

The extinguishment of the mercury may be hastened by adding a few drops of tincture of tolu or benzin occasionally.

The Br. formula, under the title *Pilula Hydrargyri*, or Mercury Pill; is mercury 2 ounces av., confection of rose 3 ounces av., liquorice root, in fine powder, 1 ounce av. The mercury is first rubbed with the confection, then with the liquorice.

Blue mass is one of the articles most frequently called for, but it is seldom made by druggists, being supplied by manufacturing pharmacists, who have better facilities for preparing it.

MEL. U. S. Honey.

A saccharine secretion deposited in the honey-comb by the bee, *Apis mellifera*, Linné." <U. S.

In pharmacy strained or drawn honey only is employed as a basis of honey preparations and sold or dispensed in medicine.

Average dose.—4 Cc. (1 fl.drachm).

Melites or **Honeys**. These are compounds of honey with medicines used chiefly for their local effects, the honey being merely a vehicle for the medicinal substances. A number of honeys are official in the

European Pharmacopœias. The following are official in the U. S. and Br. Pharmacopœias:

MEL DEPURATUM. U. S., Br. Clarified Honey.

[Mel Despumatum, Pharm. 1890].

Honey, a convenient quantity.

Distilled Water,

Glycerin, each, a sufficient quantity.

"Mix the honey intimately with 2 percent. of its weight of paper-pulp, which has been previously reduced to shreds, thoroughly washed and soaked in water, and then strongly expressed and again shredded. Then apply the heat of a water-bath, and, as long as any scum rises to the surface, carefully remove this. Finally, add enough distilled water to make up the loss incurred by evaporation, strain, and mix the strained liquid with 5 percent. of its weight of glycerin." <U. S.

Average dose.—4 Cc. (1 fl.drachm).

"Honey of commerce, melted in a water-bath, and strained, while hot, through flannel previously moistened with warm water." <Br.

MEL BORACIS. Br. Borax Honey.

Borax, in fine powder, 1 ounce or 50 Gm.

Glycerin, $\frac{1}{2}$ ounce or 25 Gm.

Clarified Honey, 8 ounces or 400 Gm.

Mix.

MEL ROSÆ. U. S. Honey of Rose.

Fluidextract of Rose, 120 Cc. or 1 fl.ounce

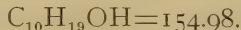
Clarified Honey, a sufficient quantity

to make 1000 Cc. or 8 $\frac{1}{2}$ ounces av.

"Into a tared vessel introduce the fluidextract of rose, then add enough clarified honey to make the contents weigh 1000 Gm., and mix thoroughly." <U. S.

Average dose.—4 Cc. (1 fl.drachm).

MENTHOL. U. S., Br. Menthol.



"A secondary alcohol $[C_6H_9(CH_4)(OH)(C_3H_7)1:3:4]$, obtained from the oil from *Mentha piperita*, Linné; or other peppermint oils. Menthol should be kept in well-stoppered bottles, in a cool place." <U. S.

Average dose.—0.065 Gm.=65 milligrammes (1 grain).

"A crystalline substance, $C_6H_9 \cdot OH \cdot CH_3C_3H_7$, obtained by cooling the oil distilled from the fresh herb of *Mentha arvensis*, DC., vars.

piperascens et glabrata, Holmes; and of *Mentha piperita*, Sm." < Br.

Dose, $\frac{1}{2}$ to 2 grains.

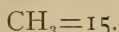
To obtain Menthol, peppermint oil is chilled by surrounding it with ice, or by placing it in a refrigerating chamber, and after standing, pouring off the liquid oil from the crystals of menthol which have formed. They are then to be drained and should be dissolved in alcohol and recrystallized to free from oil.

The menthol used in this country is mostly obtained from the ordinary peppermint oil and is sometimes called "Pip or Pep Menthol" to distinguish it from the foreign menthol which is chiefly made from the Japanese peppermint.

It dissolves readily in alcohol, ether or chloroform, but only slightly in water. It melts at 43°C . (109.4°F .), and boils at 212°C . (413.6°F .).

Uses. In the form of Menthol Cones, this was at one time very popular as an application for pain, neuralgia etc. It is now extensively used as an ingredient in spraying devices, nebulizers, inhalers, liniments, ointments etc., and in many preparations for internal use.

METHYL.



Methyl is the radical of the Methyl series of compounds of which methylic or wood alcohol is the hydrate. It forms with other bodies a large number of compounds highly important in chemistry, and in pharmacy, similar in characteristics to the compounds of Amyl, Ethyl and other radicals of the Alcohol series; (see Alcohol).

Many methyl salts are now prepared by manufacturing chemists as methyl is the basis of a considerable number of the newer remedies, and is also extensively used in the production of aniline dyes, forming some of the most brilliant colors.

The most important combination of methyl is its hydrate, methylic or wood alcohol, which is obtained by distillation from carbonaceous substances and is hence called Carbonol. It is the commercial basis of the methyl products, and has already been described under alcohol.

Methylis salicylate, or artificial oil of wintergreen, is the only official salt of methyl.

METHYLIS SALICYLAS. U. S. Methyl Salicylate [Artificial Oil of Wintergreen].



"An ester $[\text{C}_6\text{H}_4(\text{OH})\text{COOCH}_3 1:2]$, produced synthetically. It is the principle constituent of oil of gaultheria and oil of betula. For flavoring purposes oil of gaultheria, oil of betula, and methyl salicylate may be regarded as identical products." < U. S.

This "artificial oil of wintergreen" is now extensively used in place of the natural oil, and is almost identical with it in composition and

characteristics. It is wholly identical with volatile oil of betula (birch), which is also sold as oil of wintergreen. Its sp. gr. is 1.183 at N. T. It is soluble in all proportions in alcohol and glacial acetic acid, but only slightly soluble in water.

Average dose.—1 Cc. (15 minims).

METHYLTHIONINÆ HYDROCHLORICUM. U. S.

Methylthionine Hydrochloride. Methylene Blue.

"Tetramethylthionine hydrochloride, obtained by the action of hydrogen sulphide upon an oxidation product of para-amido-dimethyl aniline." < U. S.

Readily soluble in water, making a deep blue solution; less soluble in alcohol.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

MISTURÆ — MIXTURES.

In pharmacy, Mixtures, as they are generally considered, are preparations which contain insoluble substances suspended or precipitated, and are intended for internal use or administration. In a popular sense the name "mixture" is applied to a great variety of preparations, many of which are emulsions, solutions, syrups, tinctures etc. Under this heading the mixtures official in the U. S. and Br. Pharmacopœias will first be given, and then the more important unofficial mixtures which are not more naturally included under other headings. See also Proprietary Medicines, the Standard Remedies etc.

MISTURA AMMONIACI. Br.

Emulsum Ammoniaci. U. S. Ammoniacum Mixture. Br.

Ammoniacum, coarse powder,	$\frac{1}{4}$ ounce	or	5 Gm.
Syrup of Tolu,	4 fl.drachms	or	10 Cc.
Distilled Water,	$7\frac{1}{2}$ fl.ounces	or	150 Cc.

Triturate the ammoniacum thoroughly with a little distilled water so as to form a thin paste, gradually add the remainder of the distilled water and the syrup of tolu, triturating until the mixture assumes a uniformly milky appearance, strain through muslin.

Dose, $\frac{1}{2}$ to 1 fl.ounce.

MISTURA AMYGDALÆ. Br.

Almond Mixture. Br. Emulsum Amygdalæ. U. S.

Compound Powder Almonds,	2 ounces	or	20 Gm.
Distilled Water,	16 fl.ounces	or	160 Cc.

Triturate the powder with a little of the distilled water so as to form a thin paste, gradually adding the remainder of the distilled water; strain through fine muslin.

Dose, $\frac{1}{2}$ to 1 fl.ounce.

MISTURA BISMUTHI COMPOSITA.**Compound Mixture of Bismuth.**

Morphine Hydrochloride,	8 grains
Distilled Water,	4 fl.drachms
Dissolve and add	
Compound Tincture of Cardamoms,	3 fl.ounces
Chloroform,	70 minims
Liquid Extract of Nux Vomica,	135 minims
Diluted Hydrocyanic Acid,	320 minims

Mix, add

Concentrated Solution of Bismuth,	15 fl.ounces
Distilled Water, sufficient to make	20 fl.ounces

Each fl.drachm contains 2 minims of diluted hydrocyanic acid, $\frac{1}{20}$ grain of morphine hydrochloride, and the equivalent of 5 minims of tincture of nux vomica. Dose, 20 to 30 minims. <B. P. C.

MISTURA CREOSOTI. Br. Creosote Mixture.

Creosote,	16 minims or 1 Cc.
Syrup,	1 fl.ounce or 30 Cc.
Spirit of Juniper,	16 minims or 1 Cc.
Distilled Water, a sufficient quantity.	

"Shake the creosote with 14 fl.ounces (or 420 Cc.) of the distilled water; add the syrup and the spirit of juniper, and sufficient distilled water to produce 16 fl.ounces (or 480 Cc.) of the mixture." <Br.

Dose, $\frac{1}{2}$ to 1 fl.ounce.

MISTURA CRETÆ. U. S., Br. Chalk Mixture.

The U. S. formula is:

Compound Chalk Powder,	20 Gm. or 1 ounce
Cinnamon Water,	40 Cc. or 2 ounces
Water, a sufficient quantity to make	100 Gm. or 5 ounces

The compound chalk powder is to be rubbed in a mortar with the cinnamon water, and about 20 Cc.(or 1 ounce) of water gradually added, until a uniform mixture results. This is then to be transferred to a graduated vessel, the mortar rinsed with water, and sufficient water added to make the product measure 100 Cc. (or 5 ounces). The preparation should be freshly made for use, hence the small quantities directed. <U. S.

Average dose.—16 Cc. (4 fl.drachms).

The Br. formula is:

Prepared Chalk,	$\frac{1}{4}$ ounce or 5 Gm.
Tragacanth, in powder,	15 grains or 0.7 Gm.
Refined Sugar,	$\frac{1}{2}$ ounce or 10 Gm.
Cinnamon Water, a sufficient quantity.	

"Triturate the prepared chalk with the tragacanth and refined sugar, and gradually add sufficient cinnamon water to produce 8 fl.ounces (or 160 Cc.) of the mixture." <Br. Dose, $\frac{1}{2}$ to 1 fl.ounce.

MISTURA FERRI COMPOSITA. U. S., Br.

Compound Iron Mixture. [Griffith's Mixture].

Ferrous Sulphate, clear crystals,	6 Gm. or 24	grains
Myrrh, in small pieces,	18 Gm. or 72	grains
Sugar,	18 Gm. or 72	grains
Potassium Carbonate,	8 Gm. or 32	grains
Spirit of Lavender,	60 Cc. or $\frac{1}{2}$	fl.ounce
Rose Water, sufficient to make	1000 Cc. or 10 $\frac{1}{2}$	fl.ounces

Rub the myrrh, sugar and potassium carbonate with 700 Cc. (or 8 ounces) of rose water, gradually added, then with the lavender, and lastly, with the iron sulphate and enough rose water to make the measure 1000 Cc.(or 10 $\frac{1}{2}$ fl.ounces) of the mixture. Pour the mixture immediately into a bottle which should be well-stoppered. <U. S.

The Br. formula is:

Ferrous sulphate 25 grains (or 2 $\frac{1}{2}$ Gm.), potassium carbonate 30 grains (or 3 Gm.), myrrh 60 grains (or 6 Gm.), refined sugar 60 grains (or 6 Gm.), spirit of lavender 50 minims (or 4.5 Cc.), rose water 10 fl.ounces (or 437.5 Cc.). Make in the same manner as the U. S. <Br. Dose, $\frac{1}{2}$ to 1 fl.ounce.

MISTURA FERRI ET AMMONII ACETATIS.

This is now official in the U. S. P. under the title *Liquor Ferri et Ammonii Acetatis*, but has heretofore been known as a mixture. See the title mentioned.

MISTURA GLYCYRRHIZÆ COMPOSITA. U. S.

Compound Mixture of Glycyrrhiza. [Brown Mixture].

Pure Extract of Glycyrrhiza,	30 Gm. or 1	ounce av.
Syrup,	50 Cc. or 1 $\frac{1}{2}$	fl.ounces
Acacia, granulated,	30 Cc. or 1	ounce av.
Camphorated Tinct. Opium,	120 Cc. or 4	fl.ounces
Wine of Antimony,	60 Cc. or 2	fl.ounces
Spirit of Nitrous Ether,	30 Cc. or 1	fl.ounce
Water, sufficient to make	1000 Cc. or 33 $\frac{1}{3}$	fl.ounces

The extract and acacia are to be rubbed in a mortar with 500 Cc. (or 16 fl.ounces) of water until they are dissolved, and the solution transferred to a graduated vessel containing the other ingredients. The mortar is to be rinsed with water and the rinsings added, then enough water added to make the measure 1000 Cc. (or 33 $\frac{1}{3}$ fl.ounces). <U. S.

Brown Mixture Improved. As made by the foregoing formula this preparation always has quite a precipitate or sediment, and, although

this corresponds to the pharmaceutical idea of a mixture, it is quite undesirable for dispensing in this form. The following formula does away with this objection chiefly:

Glycyrrhizin, ammoniated, 160 grains; acacia, in fine powder, $\frac{1}{2}$ ounce av.; tincture of opium, camphorated, 2 ounces; wine of antimony, 1 fl.ounce; spirit of nitrous ether, $\frac{1}{2}$ fl.ounce; alcohol, 2 fl.ounces; warm water, sufficient to make a pint. Mix and dissolve.

MISTURA GUAIACI. Br. Guaiacum Mixture.

Guaiacum Resin,	$\frac{1}{2}$ ounce or 10 Gm.
Refined Sugar,	$\frac{1}{2}$ ounce or 10 Gm.
Tragacanth, in powder,	35 grains or 1.6 Gm.
Cinnamon Water,	20 ounces or 400 Cc.

"Triturate the guaiacum resin with the refined sugar and the tragacanth; add gradually the cinnamon water." < Br.

Dose, $\frac{1}{2}$ to 1 fl.ounce.

MISTURA OLEI RICINI. Br. Castor Oil Mixture.

Castor Oil,	3 fl.ounces or 75 Cc.
Mucilage of Gum Acacia,	$1\frac{1}{2}$ fl.ounces or 37.5 Cc.
Orange Flower Water,	1 fl.ounce or 25 Cc.
Cinnamon Water,	$2\frac{1}{2}$ fl.ounces or 62.5 Cc.

"Mix the undiluted orange-flower water and the cinnamon water; place the mucilage of gum acacia in a mortar and to it add, alternately, in portions, the castor oil and the mixed waters, with constant trituration." < Br. Dose, as a draught, 1 to 2 fl.ounces.

MISTURA MAGNESII ET ASAFETIDÆ.

Mixture of Magnesia and Asafetida. [Dewee's Carminative].

This was formerly official in the U. S. P., and is yet considerably called for.

Magnesium Carbonate,	5 parts or 260 grains
Tincture of Asafetida,	7 parts or 10 fl.drachms
Tincture of Opium,	1 part or 75 minims
Sugar,	10 parts or $1\frac{1}{2}$ ounces av.
Distilled Water, to make	100 parts or 1 pint

Rub the magnesium carbonate and sugar in a mortar with the tinctures, then add gradually enough distilled water to make 100 parts, or a pint.

This favorite remedy is much used for children, in doses of a teaspoonful to a tablespoonful.

MISTURA RHEI ET SODÆ. U. S.

Mixture of Rhubarb and Soda.

Sodium Bicarbonate,	35 Gm. or 1 ounce av.
Fluidextract of Rhubarb,	15 Cc. or $3\frac{1}{4}$ fl.drachms

Fluidextract of Ipeçac,	3 Cc. or 20 minims
Glycerin,	350 Cc. or 10 fl.ounces
Spirit of Peppermint,	35 Cc. or 1 fl.ounce
Water, sufficient to make	1000 Cc. or 28½ fl.ounces

The sodium bicarbonate is to be dissolved in about 400 Cc. (or 11½ fl.ounces) of water, the other ingredients added to the solution, and then enough water to make 1000 Cc. (or 28½ fl.ounces). <U. S.

MISTURA SENNÆ COMPOSITA. Br.

Compound Mixture of Senna. [Black Draught].

Magnesium Sulphate,	5 ounces or 250 Gm.
Liquid Extract of Liquorice,	1 fl.ounce or 50 Cc.
Compound Tincture of Cardamoms,	2 fl.ounces or 100 Cc.
Aromatic Spirit of Ammonia,	1 fl.ounce or 50 Cc.
Infusion of Senna, a sufficient quantity.	

"Dissolve the magnesium sulphate in 10 fl.ounces (or 500 Cc.) of the infusion of senna; add the mixed liquid extract and compound tincture and aromatic spirit and enough infusion of senna to produce 20 ounces (or 1000 Cc.) of the compound mixture." <Br.

Dose, as a draught, 1 to 2 fl.ounces.

MISTURA SPIRITUS VINI GALLICI. Br.

Mixture of Brandy.

Brandy,	4 fl.ounces or 113 Cc.
Cinnamon Water,	4 fl.ounces or 113 Cc.
Refined Sugar,	½ ounce or 14 Gm.
Two Yolks of Eggs.	

"Rub the yolks of eggs and the refined sugar together; add the cinnamon water and brandy; mix." <Br.

Dose, as a draught, 1 to 2 fl.ounces.

This is more familiarly known as Egg-Nog in this country.

Other Mixtures.

The foregoing mixtures are all that are recognized in the U. S. and Br. Pharmacopœias, but a great many have been introduced by popular physicians as their favorite mixtures, and their formulas have been preserved, and are here repeated. Other formulas for mixtures will be found under other headings.

MORPHINA. U. S. Morphine.



"An alkaloid obtained from opium." <U. S.

Morphine and its salts are among the most important and most frequently used remedies. Morphine has the distinction of being the first alkaloid discovered. It was isolated in 1817 by a German apothecary named Sertürner, who named it Morphiūm.

Preparation. The process for making Morphine was formerly official, but is not repeated in the present pharmacopœia. The U. S. P., 1870 formula, with slight changes, was:

Opium, sliced,	13½ ounces av.
Ammonia Water,	6 fl.ounces
Animal Charcoal, in fine powder,	
Alcohol,	
Distilled Water, of each, a sufficient quantity.	

Pour upon the sliced opium 4 pints of boiling water and work with a pestle in a mortar to a smooth paste. After standing a few hours, strain through a coarse sieve, and work what remains in the sieve again with boiling water until it all passes through the meshes; transfer the whole to a water-bath percolator, having first covered the diaphragm with burlap or other coarse cloth, and heat for 1 hour; then begin to percolate, adding water and continuing the heat and percolation until the drug is exhausted. Allow the liquid to settle, strain through muslin, evaporate to 6 pints and filter. To the filtrate add 5 pints of alcohol and afterwards 3 fl.ounces of the ammonia water, mixed with 8 fl.ounces of alcohol. After 24 hours pour in the remaining ammonia water, and set the liquid aside to crystallize. The alcohol retains the coloring matters, resins, caoutchouc etc., in solution. The ammonia combines with the natural acids containing morphine, and the alkaloid morphine is precipitated and may be collected and purified by dissolving the precipitate in 2 pints of boiling alcohol, filtering while hot through animal charcoal and recrystallizing.

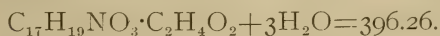
Morphine is quite insoluble, requiring 3330 parts of cold, or 500 parts of boiling water, 168 parts of cold, or 36 parts of boiling alcohol to dissolve it; it is therefore but little used in medicine, its soluble salts being used instead. In pharmacy it is used as the basis of the morphine salts, and for making oleate of morphine.

Many salts of morphine are known, but only the three U. S. official salts, the acetate, hydrochloride and sulphate are much used. They are anodyne, narcotic and sedative.

Average dose.—0.010 Gm.=10 milligrammes ($\frac{1}{5}$ grain).

Pure Food and Drugs Law. Morphine, all of its salts and derivatives, and all preparations containing them are subject to the regulations of the U. S. Pure Food and Drugs Law. The quantity contained in each ounce of any preparation must be stated on the label, if intended for inter-state commerce. The derivatives of morphine mentioned in this law are apomorphine, dionine, peronine, morphine acetate, hydrochloride, sulphate and other salts of morphine. Also all preparations containing it or the derivatives mentioned.

MORPHINÆ ACETAS. U. S., Br. Morphine Acetate.



"The acetate [$\text{CH}_3\text{COOH} \cdot \text{C}_{17}\text{H}_{19}\text{NO}_3 + 3\text{H}_2\text{O}$] of the alkaloid Morphine should be kept in well-stoppered, dark amber-colored vials; a

minute quantity of free acetic acid should be present to prevent decomposition." <U. S.

"The carefully dried salt obtained by neutralizing morphine with acetic acid." <Br.

Preparation. This is prepared according to the process formerly official as follows:

Morphine, in fine powder,	480 grains
Distilled Water,	8 fl.ounces
Acetic Acid, a sufficient quantity.	

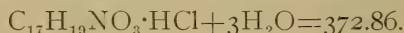
Mix the morphine with the distilled water and carefully add acetic acid, drop by drop, to the mixture, stirring constantly, until the morphine is neutralized and dissolved. Evaporate the solution by means of a water-bath to the consistence of syrup, and set aside until it concretes. Lastly, dry the salt with a very gentle heat, and rub it to a powder.

Soluble in 2.25 parts of water, 21.6 parts of alcohol, 5.2 parts of glycerin at 25°C. (77°F.). This is the most soluble morphine salt.

Average dose.—0.015 Gm.=15 milligrammes ($\frac{1}{4}$ grain).

MORPHINÆ HYDROCHLORIDUM. U. S., Br.

Morphine Hydrochloride.



"The hydrochloride [$\text{HCl} \cdot \text{C}_{17}\text{H}_{19}\text{NO}_3 + 3\text{H}_2\text{O}$] of the alkaloid Morphine. It should be kept in well-stoppered, amber-colored vials." <U. S.

"The hydrochloride of an alkaloid obtained from opium." <Br.

Preparation. The process formerly official in the U. S. P. is as follows:

Morphine, in fine powder,	480 grains
Distilled Water,	4 fl.ounces
Diluted Hydrochloric Acid, a sufficient quantity.	

Mix the morphine with the distilled water and carefully add hydrochloric acid to the mixture, drop by drop, stirring constantly until the morphine is neutralized and dissolved. Evaporate the solution by means of a water-bath, so that on cooling it may crystallize. Lastly, drain the crystals and dry them on bibulous paper.

This is the salt of morphine principally used in Great Britain.

Average dose.—0.015 Gm.=15 milligrammes ($\frac{1}{4}$ grain).

MORPHINÆ SULPHAS. U. S. Morphine Sulphate.



"The sulphate [$\text{SO}_2(\text{OH})_2 \cdot (\text{C}_{17}\text{H}_{19}\text{NO}_3)_2 + 5\text{H}_2\text{O}$] of the alkaloid morphine should be kept in well-stoppered, amber-colored vials." <U. S.

Preparation. The process formerly official in the U. S. P. is as follows:

Morphine, in fine powder,	489 grains
Distilled Water,	8 fl.ounces
Diluted Sulphuric Acid, a sufficient quantity.	

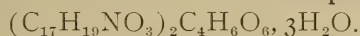
Mix the morphine with the distilled water, then carefully add diluted sulphuric acid, drop by drop, constantly stirring until the morphine is neutralized and dissolved. Evaporate the solution by means of a water-bath, so that on cooling it may crystallize. Lastly, drain the crystals and dry them on bibulous paper.

Morphine sulphate is employed in the U. S. much more than any other salt of morphine, in fact, the other salts are but little used.

Fatal mistakes sometimes occur by dispensing it for quinine, as it so much resembles it in general appearance. It should never be transferred to a shelf or dispensing bottle, but should always be kept in an original $\frac{1}{8}$ ounce bottle, and distant from the package containing quinine; all danger will thus be avoided.

Average dose.—0.015 Gm.=15 milligrammes ($\frac{1}{4}$ grain).

MORPHINÆ TARTRAS. Br. Morphine Tartrate.



"Morphine Tartrate may be prepared by the combination of morphine and tartaric acid in molecular proportions." < Br.

This salt may be prepared in the same general manner as the foregoing, by neutralizing a solution of tartaric acid with morphine, and crystallizing. It was first made official in the 1898 Br. P.

Dose, $\frac{1}{8}$ to $\frac{1}{2}$ grain.

Antidote for Morphine.

Potassium permanganate has proven to be the most reliable antidote to morphine poisoning. If the morphine is taken by the stomach, the permanganate should be taken in solution, at least as much again of the permanganate salt being used as was taken of the morphine. If the morphine was administered hypodermically, so should be the permanganate solution. Paraldehyde with small doses of picrotoxin has also been recommended.

Other Salts of Morphine.

Other salts of morphine are sometimes prescribed; as the meconate and bimeconate of morphine, which are combinations of meconic acid with morphine; the bromide or hydrobromide of morphine, being morphine combined with hydrobromic acid; the nitrate, hydriodate, valerianate etc., being combinations of morphine with these acids; but there is little use for any except the official salts.

Morphine Borate has been introduced for hypodermic use, as its solution is always antiseptic. Dose $\frac{1}{8}$ grain.

Morphine Diacetyl. This is the chemical name for the salt of morphine popularly known as **Heroin**. See that tilte. The hydrochloride of this salt, which is more soluble, is generally used.

Morphine Phtalate is a new salt of morphine recommended for hypodermic use, on account of its antiseptic qualities. Dose $\frac{1}{8}$ grain.

MORRHUOLUM. Morrhuol. Gaduol.

Official in the Nedl. S.

An alcoholic extract of cod liver oil prepared by shaking the oil with successive portions of hot alcohol and evaporating the alcoholic extract thus obtained so that one volume of the finished extract shall represent four volumes of the oil treated. ($1=4$).

It is an oily, brownish-yellow liquid, having a bitter, acrid taste, and is used in capsules, or made into an elixir or wine of Cod Liver Oil.

Dose, 5 to 15 minims. See Elixir and Wine of Cod Liver Oil.

MUCILAGINES — MUCILAGEŠ.

Mucilages, as they are understood in pharmacy, are thick, viscid liquids, prepared by dissolving gums or other vegetable substances containing mucilaginous properties, in water, either cold or by the aid of heat. They are used in medicine chiefly for suspending more active medicinal substances, for soothing irritated internal or external surfaces, and for their local action as palliatives.

In pharmacy they are used for making pill masses, troches, emulsions, mixtures etc.

The gum mucilages are also extensively used as adhesives for labels, papers etc., and some of the other mucilages are employed as bases for toilet preparations, such as bandoline, fragrant cream etc.

The mucilages official in the U. S. and Br. Pharmacopœias are as follows:

MUCILAGO ACACIÆ. U. S., Br. Mucilage of Acacia.**Mucilage of Gum Acacia.**

The U. S. formula is:

Acacia, in small fragments,	340 Gm. or 3.4 ounces
Lime Water,	330 Gm. or 3.3 ounces
Water, sufficient to make	1000 Gm. or 10 ounces

The acacia is to be washed with cold water and drained, then the lime water added to it, and enough water to make the mixture weigh 1000 Gm. (or 10 ounces); agitate or stir occasionally until the acacia is dissolved, and strain. It is to be kept in well-stoppered bottles, completely filled, in a cool place. < U. S.

The Br. P. directs gum acacia in small pieces 4 ounces (or 100 Gm.), distilled water, a sufficient quantity. Rapidly rinse the gum acacia with a little distilled water; then dissolve it in 6 fl. ounces (or 150 Cc.) of distilled water in a closed vessel and strain.

In making mucilage of acacia for medicinal use the best quality of gum acacia should be used; for making "mucilage" for adhesive purposes inferior gum is selected.

Uses. In pharmacy acacia mucilage is used for making emulsions, and in masses, mixtures, tinctures and compounds. In medicine it is

employed as a vehicle for suspending powders and other kinds of medicine.

Average dose.—16 Cc. (4 fl.drachms).

MUCILAGO SASSAFRAS MEDULLÆ. U. S.

Mucilage of Sassafras Pith.

Sassafras Pith,	2 Gm. or 72 grains
Water,	100 Cc. or 8 fl.ounces

Macerate for 3 hours and strain without expression. This preparation should be freshly made when wanted.

Uses. This mucilage has the flavor of sassafras, and is chiefly used in cough mixtures.

Average dose.—16 Cc. (4 fl.drachms).

MUCILAGO TRAGACANTHÆ. U. S., Br.

Mucilage of Tragacanth.

The U. S. formula is:

Tragacanth,	6 Gm. or 216 grains
Glycerin,	18 Gm. or 1 fl.ounce
Water, to make	100 Gm. or 8 fl.ounces

“Mix the glycerin with 75 Cc. (or 5½ fl.ounces) of water, heat the mixture to boiling, add the tragacanth, and macerate during 24 hours, stirring occasionally; then add enough water to make 100 Gm. (or 8 fl.ounces); beat it to a uniform consistence and strain forcibly through muslin.” <U. S.

The Br. formula is: Tragacanth, in powder, 60 grains (or 5.5 Gm.); alcohol, (90%), 2 fl.drachms (or 10 Cc.); distilled water, a sufficient quantity. Mix the tragacanth with the alcohol in a bottle, then pour in water enough to make 10 fl.ounces (or 400 Cc.), with constant agitation.

Uses. Tragacanth mucilage is used chiefly as an excipient for pills and to mix with troches and other substances required to be made into a mass. It is employed also as an adhesive for labels etc.

Average dose.—16 Cc. (4 fl.drachms).

MUCILAGO ULMI. U. S. Mucilage of Elm.

Elm, sliced and dried,	6 Gm. or 216 grains
Boiling Water,	100 Cc. or 8 fl.ounces

“Digest the elm with the water on a water-bath, in a covered vessel, during one hour, then strain. This preparation should be freshly made when wanted.” <U. S.

MYRRHA. U. S., Br. Myrrh.

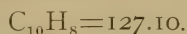
“A gum-resin obtained from *Commiphora Myrrha* (Nees) Engler (Fam. Burseraceæ).” <U. S.

"A gum-resin obtained from the stem of *Balsamodendron Myrrha*, Nees, and probably other species." <Br.

Average dose.—0.500 Gm.=500 milligrammes (7½ grains).

This is more fully described in the Organic Materia Medica Section, Part I.

NAPHTHALENUM. U. S. Naphthalene.



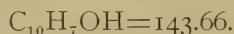
"A hydrocarbon obtained from coal-tar, and purified by crystallization. It should be kept in well-stoppered, amber-colored bottles." <U. S.

When coal-tar is distilled, naphtha first passes over, after that naphthalene, which is volatilized with vapor of water, distils over and is collected in the form of shining transparent laminæ. It is insoluble in water, but soluble in 15 parts of alcohol at N. T., and in ether, chloroform and oils. It volatilizes slowly at ordinary temperature and rapidly when heated; it melts at 80°C. (176°F.), and boils at 218°C. (424.4°F.); its vapor is inflammable.

It is commonly known as **coal-oil camphor**, or **moth camphor**. It is made in flakes and in cakes and balls, the latter being known as "moth balls." It is much used as a disinfectant, also in ointments and lotions for parasitic diseases.

Average dose.—0.125 Gm.=125 milligrammes (2 grains).

NAPHTHOL. Br. Naphthol. [Beta-Naphthol].



"Beta-naphthol or beta-mono-hydroxy-naphthalene, $\text{C}_{10}\text{H}_7\text{OH}$. is usually prepared from naphthalene-sulphonic acid." <Br.

This may be prepared by digesting naphthalene with three parts of sulphuric acid. Heat the mixture to 80°C. when α - and β -naphthalene-sulphonic acids are formed, and may be separated from the acid, the α - acid passes into the β - variety, therefore the latter acid is always produced at a higher temperature (up to 160°C.). Both of the naphthalene-sulphonic acids may be fused with sodium or potassium hydroxide, and yield the corresponding naphthols which are known as α - and β -naphthols, the latter being the official naphthol as above.

It is in colorless or amber-colored, shining crystalline laminæ, or in powder, having a faint, phenol-like odor and a sharp and pungent but not persistent taste. It is soluble in about 1000 parts of water and in 0.75 part of alcohol at N. T.; also very soluble in ether, chloroform or solutions of the caustic alkalies. It readily sublimes when heated; it melts at 122°C. (251.6°F.), and boils at 186°C. (346.8°F.). This is used for similar purposes as naphthalene in the form of ointments, solutions etc. It has also been given internally in

doses of 5 to 8 grains in typhus fever and obstinate diarrhœa.

Dose, 3 to 10 grains. Br.

NICCOLUM — NICKEL.

Symbol Ni; Atomic weight ($O=16$) 58.68; Sp. gr. 8.8.

Nickel is a metal classed chemically with manganese, cobalt, zinc etc. It was first made known by Cronstedt in 1751. It is obtained from ores found in different parts of the world, by fusing them and separating the nickel by various means. It is hard, white, malleable and magnetic, resembling silver, but harder, being therefore better adapted for plating, for which it is extensively used. It forms alloys with copper and zinc, known as German silver, albata etc., which are much employed as a basis for silver-plated ware. It is also used as a coin of small denomination in the United States. Its salts are not used in medicine, but some of them are extensively used in electroplating solutions.

Nickel and its compounds are more fully described in the Chemical Section of this work, Part I.

NITROGENIUM — NITROGEN.

Symbol N; Atomic weight ($O=16$) 14.01; Sp. gr. 0.97.

Nitrogen is a colorless, odorless and tasteless gaseous element, discovered in 1772 by Rutherford, and found to be a constituent of the atmosphere (of which it forms about four-fifths), by Lavoisier, in 1777. It is also called Azote. It is an essential constituent of animal matter, and enters largely into the composition of all vegetable substances, and, in the form of salts, forms an important portion of the alluvial soils. In the atmosphere it serves the purpose of diluting the oxygen. In a free gaseous state its qualities are neutral and negative, but combined with other elements it forms very energetic compounds. Its principle combination with hydrogen is Ammonia, NH_3 —from which is derived a great number of valuable substances; with carbon it forms Cyanogen, CN , the basis of a class of poisonous salts. Its combinations with oxygen are of the greatest importance, forming acids which unite with the bases to produce Nitrites and Nitrates. It is also an essential constituent of all the alkaloids, and many other principles of plants.

Nitrogen is most readily obtained by boiling a solution of Nitrate of Ammonium and collecting the vapor, which consists of water and nitrogen gas. It is now obtained commercially from the atmosphere by separation, the air being passed over some heated metal that absorbs the oxygen, leaving the nitrogen free to be collected in a receiving tank.

Nitrogen and its compounds are more fully noticed in the Chemical Section of this work, Part I.

NUCLEIN.

A preparation by this name is prepared from the spleen of domestic animals. It is in the form of a yellowish-white powder, soluble in alkaline solutions. It is given in 40 to 100 grain doses for tuberculosis. A nuclein solution is made by Parke, Davis & Co. containing 5 percent. nucleinic acid from yeast. It can be used either internally or hypodermically. Nuclein is soluble in dilute alkaline solutions, but little soluble in water and insoluble in alcohol. The nucleinic acid derived from yeast is generally used for combining with metallic substances; as with copper, forming cuprol; with mercury, forming mercuriol; with silver, forming nargol, etc.

NUX VOMICA. U. S., Br. Nux Vomica.

"The dried, ripe seed of *Strychnos Nux-vomica*, Linné (Fam. Loganiaceæ), yielding, when assayed by the process given, not less than 1.25 percent. of strychnine." <U. S.

"The dried, ripe seeds of *Strychnos Nux-vomica*, Linn." <Br.

An assay process is given in the U. S. P. by which the percentage of strychnine is determined and it is required that this drug shall contain 1.25 percent. of this alkaloid. *Nux-vomica* is further described in the Organic Materia Section in Part I.

Average dose of powdered *nux vomica*.—0.065 Gm.=65 milligrammes (1 grain).

OLEA — OILS.

Under this heading are classed a great variety of substances ranging from liquids to solids, and obtained from the mineral, animal and vegetable kingdoms. They are very properly divided pharmaceutically into Fixed Oils, which are obtained by expression from fatty bodies, and Volatile Oils, which are mainly obtained by distillation, and these again may be arranged in several groups according to their characteristics, manner of making etc. To these classes may be added the Mineral Oils, which, though not officially recognized, are considerably used in pharmacy; and many mixed and Medicated Oils, which have their uses in medicine and the arts.

FIXED OILS.

Fixed oils are fatty bodies, either liquid or semi-solid or solid, obtained usually by expression from vegetable or animal substances of a fatty nature. They differ from volatile oils by having a greasy feeling to the touch, while volatile oils do not, and by leaving a permanent oily spot on paper, while volatile oils do not. Volatile oils are also vaporized by a degree of heat which will boil water, while the fixed oils remain unchanged at that temperature.

In the arts, the fixed oils, both of vegetable and animal origin, are extensively used for many industrial purposes, but in pharmacy no animal oils, except lard and cod liver oil, are officially recognized.

The fixed oils and fats are, chemically, glyceryl oxides or compound ethers, produced by the union of the fatty acids peculiar to each substance with glycerin (glyceric alcohol). They consist generally of the neutral principles, Olein, $C_3H_5(C_{18}H_{33}O_2)_3$, which is a liquid, combined with Palmitin or Stearin, which, when separate, usually are solid at ordinary temperatures but when combined with olein may be soluble in it at ordinary temperatures, making many of the fixed oils solid in winter and fluid in summer. Margarin is considered a mixture of stearin with other like principles. The neutral principles may be decomposed into glycerin and Oleic Acid, $C_{18}H_{34}O_2$, Stearic Acid, $C_{18}H_{36}O_2$, and Palmitic Acid, $C_{16}H_{32}O_2$.

Fixed oils are usually obtained by pressing the fatty substances, either with or without the aid of heat, in strong layer presses, by which the oily liquids are separated from the more solid fatty matters, or from the solid constituents of seeds etc. Because of the method usually used in obtaining the fixed oils they are frequently called "expressed oils." Some of the fixed oils, however, (especially flaxseed oil), are obtained by solution in naphtha, which is afterwards distilled off or evaporated, leaving the fixed oil.

The following are the fixed or expressed oils official in the leading pharmacopœias. The processes for making them are not generally given, as they are not usually prepared except in a large way, by the aid of expensive machinery.

OLEUM ADIPIS. U. S. Lard Oil.

A fixed oil obtained by expression from lard at a low temperature. This is known on the market as summer-strained and winter-strained lard oil, the winter-strained being pressed at a much lower temperature than the former. Sp. gr. 0.905 to 0.915 at 25°C. (77°F.). Lard oil is used as a lubricant and for burning in lanterns and signal lamps and in pharmacy for making citrine ointment, hair oil etc.

OLEUM AMYGDALÆ EXPRESSUM. U. S.

Expressed Almond Oil.

Oleum Amygdalæ. Br. Almond Oil.

A fixed oil obtained from bitter or sweet almond. The almonds are deprived of the colored powder adhering to them by rubbing together, or are blanched, then ground in a mill and the meal enclosed in strong linen bags and pressed between warmed iron plates. The yield is 35 to 40 percent. The sp. gr. is 0.910 to 0.915 at 25°C. (77°F.). Used for making rose-water ointment and whenever a fine bland oil is required.

Average dose.—30 Cc. (1 fl.ounce).

OLEUM COCOS. Coconut Oil.

A fixed oil expressed from the seeds of *Cocos nucifera*, having a white color and the consistence of butter. This is considerably used as a lubricant and emollient. It has the odor of coconut.

OLEUM GOSSYPII SEMINIS. U. S. Cotton Seed Oil.

A fixed oil expressed from the seed of *Gossypium herbaceum* and subsequently purified. The kernels of cotton seed are separated from their testa, ground, and the oil expressed by powerful pressure. It is then purified by treating and filtering, and put upon the market under various names, and for various purposes. Sp. gr. 0.915 to 0.921 at 25°C. (77°F.). The ordinary cotton seed oil is largely used to adulterate linseed and olive oil, and is sold as cheap paint oil and sweet oil. The finer grades are known as "Salad Oil" etc. Although directed for making several liniments etc., in the U. S. P., it has not proven very satisfactory. It is considerably used as a base for hair oil.

Average dose.—16 Cc. (4 fl.drachms).

OLEUM LAURI. Expressed Oil of Laurel.

An oil expressed from the fruit of *Laurus Nobilis*, of the consistence of lard and consisting both of fixed and volatile oils. It is dark-green and aromatic. Chiefly used for its coloring properties.

OLEUM LINI. U. S., Br. Flaxseed Oil. Linseed Oil.

A fixed oil expressed from flaxseed without the use of heat. This oil is now mostly made by treating or percolating the ground flaxseed with petroleum naphtha, and then distilling off the naphtha, the linseed oil being left in the boiler of the still and subsequently purified. Linseed oil is extensively used for painting and other industrial purposes, and in pharmacy for making liniments, soft soap etc., and internally as a laxative.

Average dose.—30 Cc. (1 fl.ounce).

OLEUM MORRHUÆ. U. S., Br. Cod Liver Oil.

A fixed oil obtained from the fresh livers of *Gadus Morrhua*, Linné; or other species of *Gadus*. This oil is prepared in the cod-fishing districts by heating the fresh livers in a wooden tank by means of steam. The oils and other matters are drained off and separated by standing, and the oil filtered, then cooled or frozen that it may deposit the heavier fats, then pressed in linen bags to obtain the pure light oil. Cod liver oil is extensively used in medicine, plain and combined in many ways. It is often prescribed by the name *Oleum Jecoris Aselli*, its German-Latin title.

Average dose.—16 Cc. (4 fl.drachms).

Morrhuelines, or Alkaloids of Cod Liver Oil. Morrhuel and Gaduel are names of an alcoholic extract from which elixir, glycerite and wine

of cod liver oil are prepared. The most important active principles of the oils are the alkaloids, discovered in 1889 by M. Armand Grautier, (Professeur à la Faculté de Médecine de Paris), and one of his students, M.L. Mourgues, (Professor à Santiago de Chili).

Further investigations made by Mr. Grautier in 1891 and 1892, on chemical and physiological lines, show that the principal bases of Cod Liver Oil are:

Amylamine, $C_5H_{13}N$; Dihydrolutidine, $C_7H_{11}N$; Oxycollidine, $C_8H_{11}NO$; Morrhaine, $C_{10}H_{27}N_3$; Nicomorrhaine, $C_{20}H_{23}N_4$; Asseline, $C_{25}H_{32}N_4$; Morrhic Acid, $C_9H_{13}N_3O$.

The last of these, while having the properties of an acid, is at the same time slightly basic.

The most abundant and most active of these principles are amylamine, oxycollidine, morrhaine and nicomorrhaine.

These alkaloids have all a somewhat similar action; in small doses they excite the activity of the nervous system and the intraoxidization processes, they assist the digestive functions, stimulate assimilation and circulation, and purify the whole system of its impurities, as is indicated by the enormous quantity of urine secreted under their influence, the acceleration of the sudoral secretions and the increased appetite.

Cod liver oil has always been known to produce these phenomena, but the experiments of M. Grautier and Mourgues, Laborde, Boillot etc., on animals and man, have established without doubt that these effects are especially due to the presence of the alkaloids of this oil. The value of this popular drug as a medicament therefore is fully confirmed and scientifically explained.

OLEUM MYRISTICÆ EXPRESSUM. Expressed Oil of Nutmeg.

A concrete oil obtained by means of expression and heat from nutmeg. This is of the consistence of lard and is called Myristicæ Adeps, also Butter of Nutmeg. It is used as a vehicle for other medicines, usually employed externally.

OLEUM OLIVE. U. S., Br. Olive Oil.

A fixed oil expressed from the ripe fruit of *Olea Europæa*. This oil has been extensively used in pharmacy in all countries, and is an important article of commerce. The finer grades, which are obtained from the first expression of choice fruit, are called Virgin Oil; the cheaper grades are made after the virgin oil has been expressed by heating the cake with boiling water and strong expression. Imported Salad Oil is a fine quality of olive oil. In pharmacy it is used in liniments, plasters and ointments, and for many other purposes. The color of olive oil is from a light straw to a greenish color. Its sp. gr. is 0.910 to 0.915 at $25^{\circ}C$. ($77^{\circ}F$).

Average dose.—30 Cc. (1 fl.ounce).

OLEUM PALMÆ. Palm Oil.

This is a semi-solid oil obtained from the fruit of several species of *Palmæ*, found in Guinea and South America. It is seldom employed in medicine but is extensively used in making soap. It is of the consistency of butter and has an orange color.

OLEUM PAPAVERIS. Poppy Oil.

A fixed oil expressed from the seeds of *Papaver Somniferum*. This is a very bland oil, free from irritating qualities and albuminous matter. It is sometimes employed in medicine and is sold for fine painting and to oil watches etc. It is frequently sold as "Watch-maker's Oil."

OLEUM RAPÆ. Oil of Rape Seeds.

A fixed oil obtained by expression from the seeds of the cultivated varieties of *Brassica* or Rape. This is a bland oil, used for the same purposes as oil of cotton seed or mustard.

OLEUM RICINI. U. S., Br. Castor Oil.

A fixed oil expressed from the seed of *Ricinus Communis*. The seeds or beans of the castor oil plant are crushed and subjected to powerful pressure, and the oil then purified by heating with water to remove the albuminous matter. The clear oil is then filtered and constitutes the cold-pressed castor oil of commerce. An inferior quality is made by pressing the cake between heated plates. Castor oil is a well-known cathartic in doses of a teaspoonful to a fl.ounce. It is much more effective in the form of an emulsion. Sp. gr. 0.945 to 0.965 at 25°C. (77°F.). It mixes with alcohol in all proportions and is considerably used as a base for hair oil, mixed 2 parts of oil with 1 part of alcohol.

Average dose.—16 Cc. (4 fl.drachms).

OLEUM SESAMI. Oil of Sesamum. Oil of Benné.

A fixed oil expressed from the seeds of *Sesamum Indicum*. This is a bland, odorless oil, similar to oil of almonds or olive oil, and may be used for similar purposes. It is used in making a number of medicines and as a base for hair oil and for other similar purposes.

OLEUM SINAPIS EXPRESSUM. Expressed Oil of Mustard.

A fixed oil obtained by expression from the seeds of *Sinapis alba* or *nigra*. This oil very much resembles cotton seed oil. It is made chiefly in California, and is used as a base for hair oil and for other similar purposes.

**OLEUM THEOBROMATIS. U. S. Oil of Theobroma.
Butter of Cacao. Cacao Butter.**

A fixed oil expressed from the seeds of *Theobroma Cacao*. This oil resembles tallow, and is made by pressing the kernels or nibs of

the chocolate nut between hot iron plates and running the oil into moulds. It is used in pharmacy for making suppositories, for which it is best adapted of any substance, having a low melting point (86° to 95° F.), and a firm consistence when cold. It is sometimes used in making ointments, and is a favorite requisite for the toilet for rubbing over the face, hands, lips etc.

OLEUM TIGLII. U. S. Croton Oil.

Oleum Crotonis. Br. Croton Oil.

A fixed oil expressed from the seed of *Croton Tiglium*. Sp. gr. 0.935 to 0.950 at 25° C. (77° F.). This oil is employed externally as a rubefacient and vesicant. Internally it is a powerful purgative in doses of 1 drop. It is sometimes combined in pills, but seldom given in any other form on account of its irritating effect.

Average dose.—0.05 Cc. (1 minim).

Other Animal Oils.

Oleum Animale Æthereum. Dippel's Animal Oil. This is obtained by dry distillation from bones and animal substances, and is known as bone oil. It has a very fetid odor, which is removed by rectifying, the purified oil being used in smelling salts etc.

Bear's Oil or Bear's Grease. This is obtained by "trying out" the internal fat of the bear. It resembles lard and is much esteemed as a base for hair pomade, a popular article of this kind being known.

Goose Oil, Hen's Oil, Rattlesnake Oil, Skunk's Oil and Woodchuck Oil are all made in a similar manner and are used in domestic medicines externally for swellings, rheumatism etc., and sometimes internally for croup etc.

Angleworm Oil. This may be made by putting a quantity of angleworms in a bottle, covering them with olive oil and keeping them exposed to sunshine for several days until a sediment has separated. The oil is then decanted, filtered or strained. This may also be made by "trying out" the oil by heat. It is a domestic remedy for rheumatism, stiff joints etc.

Oleum Lanæ. Lanolin. This is a fatty oil obtained from the washings of wool, and now considerably used as an ointment base. It is more readily absorbed than any other fats. It is also known by other names, as Wool Fat, Agnine etc. See *Adeps Lanæ*.

Neatsfoot Oil. This is made by boiling the feet of cattle, deprived of their hoofs, in water and removing the oil which rises to the surface, and after it has stood sometime in warm water, straining it. This is used for softening leather, for stiff joints etc., and in some liniments.

Sperm Oil. This is obtained from the cavities in the head of the Sperm Whale, and is the source of *Spermaceti*. Sperm oil, when pur-

ified, is extensively used as a lubricating oil for fine machiners, it is considered the best Sewing Machine Oil. It is best purified by heating to coagulate any albuminous matter, then filtering, and then chilling with ice and pressing out in linen bags.

Tanner's Oil and **Train Oil** are obtained from various kinds of fish, generally of the larger species, the whale, walrus, shark, porpoise etc., but also from the refuse of smaller fish which are dressed for marketing. Tanner's oil, which is made chiefly of the smaller fish and refuse, is used for dressing leather. Train oil is generally used for lamps and lanterns, and is chiefly prepared from whale and walrus blubber.

Oleum Vitelli Ovi. This is prepared by heating the yolks of eggs by a salt water bath in a porcelain capsule, stirring the contents but lightly until a portion pressed between the fingers lets the oil flow freely; then it is to be introduced into a cotton sack and pressed between plates to force out the oil. Filter the oil obtained at a temperature of 30°C. Seal in small bottles.

Whale Oil. An oil obtained by "trying out" the blubber of the whale. It is chiefly used for dressing leather and making whale oil soap. Many other fish oils are used for similar purposes, as Menhaden Oil, Porpoise Oil, Seal Oil, Shark Oil, Walrus Oil etc. Dugong Oil and Eulachon Oil have been proposed as substitutes for Cod Liver Oil, but are not used in this country.

Other Vegetable Fixed Oils.

Nut Oils. These are prepared as a rule by grinding the kernel or "meat" of the nuts to a coarse meal and expressing the oil, either by cold expression, or between heated iron plates. The oils from nuts are generally bland and have an odor somewhat resembling the nuts from which they are obtained.

Beech-nut oil, Brazil-nut oil, ground-nut oil, hazel-nut, hickory-nut oil, walnut oil, peach-pit or Persico oil and other similar oils are obtained in this manner. Coco-nut oil, candle-nut oil, bayberry oil and other solid oils are obtained by boiling the nuts or fruit in water, expressing while hot, and collecting the oil when cold from the surface.

Oils from Seeds. The oils from seeds are prepared either by expression or by percolating the ground seeds with naphtha, ether, or some other solvent of the oils, then evaporating the light substance by distillation, leaving the oil in the boiler of the still, the latter process being generally preferred as it insures a larger yield of oil at less expense. The following unofficial oils are made in this manner:

Oils of burdock, cardamom, chaulmoogra, cucumber seed, ergot, hemp, hyoscyamus seed, larkspur seed, melon seed niker seed, pumpkin seed, stramonium seed, sunflower seed and tonka.

Oils from Fruits. The oils from fruit are usually obtained by making the fruit into a pulp and steeping in water, then pressing and collecting the oil which rises to the surface. Palm oil is the most used of any unofficial oil of this kind, large quantities being consumed in the manufacture of soap. Mangosteen oil, behn oil, and tucum oil are sometimes used. Olive oil is the most familiar of the fixed oils obtained from fruit; the virgin oil is obtained by pressing the fresh fruit and the common oil by macerating the pressed cake in water and again pressing.

VOLATILE OILS.

Volatile oils are obtained from plants mainly by the process of distillation. They consist generally of the odorous principles of the plants from which they are obtained and are therefore called *Essential Oils*. The term *Otto* instead of oil is used in perfumery to designate the essential oils, as being less liable to mislead when there are fixed and essential oils from the same substance.

The volatile oils are divided chemically into several classes.

Hydrocarbons or Terpenes, which consist of carbon and hydrogen (usually $C_{10}H_{16}$), of which oil of turpentine is the type.

Oxygenated Oils, which contain oxygen combined with the hydrocarbon radical, and of which cinnamon oil is an example.

Sulphurated Oils, which contain sulphur combined with a hydrocarbon radical, of which volatile oil of mustard is an example.

Nitrogenized Oils, which contain hydrocyanic acid, or nitrogen combined with a hydrocarbon radical, of which essential oil of almond and its associates are all that are known.

Many of the volatile oils which have chemically the same composition are entirely different in odor and other characteristics. For example, oil of turpentine, oil of orange, oil of lemon and oil of bergamot are all terpenes, having the chemical formula $C_{10}H_{16}$, their difference consisting only in the arrangement of the carbon and hydrogen atoms in the molecule.

Volatile oils consist generally of two or more parts, which volatilize or congeal at different temperatures, as would a mixture of alcohol and water. The lighter or more ethereal portion may be separated by distillation at a moderate temperature, and is generally much more soluble than the heavier portion that remains behind. By congealing or freezing many of the oils a solid matter is obtained which is called **Stearopten**. This may be collected and separated from the oil by pressure.

The terpenes are designated by the termination **ene**, as thymene, and the stearoptens by the termination **ol**, as menthol, thymol etc.

The methods employed for obtaining the essential oils of plants are such as experience has shown to be best suited to the nature of the

substance from which the oil is obtained and the character of the product required. They are described generally as follows:

Distillation by Steam is the most approved method for obtaining the volatile oils of most plants. It consists in forcing steam through the mass of green or partly dried plants contained in a suitable chamber with a perforated bottom to properly distribute and admit the steam, and collecting the vapor which rises in a suitable condenser, and afterward separating the oil from the surface of the water by means of woolen blankets, or by dipping off into a separating funnel, or by a pipette.

Distillation with Water. Some oils are volatilized at a temperature lower than that of boiling water, and may be obtained by heating in water to nearly its boiling point, and condensing the vapor which rises. Most of the volatile oils may be obtained by distilling the plants with water, but the yield is not so large as by steam distillation. In distilling many of the oils with water, salt should be added to produce a higher degree of heat, and thereby more completely volatilize the heavier portions of the oil. Sufficient water should be added, as a rule, to cover or nearly cover the substances from which the oil is to be distilled, and a false bottom or rack should be used to keep the plants from burning on the bottom of the boilers.

Distillation from Substances. Pitch, tar, resins, the balsams, gum-resins and other substances are distilled without the aid of water or steam by simply heating them in the boiler and condensing the vapor which rises. Oil of turpentine, oil of copaiba and oil of tar are examples of this class. Petroleum oils are refined in this manner, and the volatile products of coal and other substances are obtained by dry or destructive distillation of the crude substances.

Mechanical Means. The citrine oils, orange, lemon and bergamot, are best obtained by pricking the rinds of the fruit and thus liberating the oil contained in the oil cells. This is most conveniently done by means of the **Ecuelle**, which consists of a large number of sharp-pointed nails or needles, arranged in a shallow disc or cup. The fruit is rotated over these points, thereby rupturing the oil cells and liberating the oil, which is collected in the ecuelle. These oils, and also the volatile oils of some other fruits and seeds, are also obtained by grinding and expressing and subsequently separating the oils from the other liquid matter. These oils may also be obtained by distillation, but their flavor is thereby impaired.

Other methods. The foregoing methods of obtaining the essential oil of plants are generally employed, but some odorous principles of substances are so volatile, or so prone to decomposition, that they cannot be obtained by the processes described. The fresh flowers are therefore macerated in some bland oil, as almond or benne oil or purified mineral oil, or digested by the aid of gentle heat in the same;

imparting to the bland oil their odorous principles. These are known as Fatty Oils as, fatty oil of jasmine, tuberose, valley lily etc. When digested in deodorized alcohol or cologne spirit in the same manner, or when the fixed oils thus perfumed are digested with cologne spirit, the product is known as spiritous oil. The process of *Enfleurage* is also extensively employed for obtaining the odorous principles of delicate flowers. It consists of spreading fresh flowers on thin layers of purified fatty bodies and changing them as frequently as their odor has been absorbed for fresh flowers of the same kind. The products are called flower pomades, and are known as No. 24 or No. 30, according to the number of times the flowers have been changed. These pomades are used for making the *Extracts* or *Extraits* which are employed in perfumes, their spiritous solutions being sometimes called spiritous oils.

The odors of flowers are sometimes obtained by percolating or macerating with carbon disulphide or ether, and afterwards distilling the percolate, leaving the heavier odorous substances in the boiler. Manufacturers now have special odorless solvents for extracting the essences of flowers by percolation.

Official Volatile Oils.

Huiles Volatiles, (Essences), Fr.; *Olea Aetherea*, *Ätherische Öle*, G.; *Essenze*, It.; *Aceites Volátiles*, Mex., Sp.; *Aetherolea*, *Æteriske Oljer*, Nor.; *Ætherolea*, *Flygtiga Oljor*, Swed.

The following are the volatile oils official in the leading pharmacopœias. They are but a small portion of the essential oils that are used, but all that are employed to any extent in medicine.

OLEUM ÆTHEREUM. U. S. Etherial Oil.

"A volatile liquid consisting of equal volumes of heavy oil of wine and ether." < U. S.

Alcohol,	1000 Cc.
Sulphuric Acid,	1000 Cc.
Distilled Water,	25 Cc.
Ether, a sufficient quantity.	

The sulphuric acid is to be slowly added to the alcohol and mixed thoroughly, allowing the mixture to stand in a closed flask for 24 hours, or until the liquid is clear. The clear liquid is then to be poured into a tubulated retort of such capacity that the mixture shall nearly fill it. A thermometer is to be inserted through the tubulure, so that the bulb shall be deeply immersed in the liquid, and, having connected the retort with a well-cooled condenser, and also having connected with the receiver a bent glass tube for conducting the uncondensed gases into water, heat is to be applied by means of a sand-bath, at a temperature between 150° and 160°C. (302° and 320°F.),

and the liquid distilled until oily drops cease to come over or until a black froth, which forms on the surface, begins to rise in the retort. The yellow ethereal liquid of the distillate is to be separated from it and exposed to the air in a shallow dish for 24 hours. It is then to be transferred to a wet filter, and, when the aqueous portion has drained off, the oil remaining in the filter is to be transferred to a graduated vessel and an equal volume of ether added to it. Keep the product in small glass-stoppered vials in a cool place. <U. S.

This is used in the preparation of Spiritus Ætheris Compositus. Its sp. gr. is 0.905 at 25°C. (77°F.). The preparation as made before adding the ether is known as "Heavy Oil of Wine."

OLEUM BERGAMOTTÆ. Oil of Bergamot.

This oil is prepared from the fresh rind of the fruit of citrus Bergamia, in the same manner as oil of orange previously described. It is, like it, a terpene, $C_{10}H_{16}$, and develops a terebinthine odor when exposed. It is used extensively in cologne and perfumery, and is a popular flavor for hair oils etc.

OLEUM AMYGDALÆ AMARÆ. U. S. Oil of Bitter Almond.

"A volatile oil obtained from Bitter Almond and other seeds containing amygdalin, yielding, when assayed as directed, not less than 85 percent. of benzaldehyde, and not less than 2 percent. nor more than 4 percent. of hydrocyanic acid. It should be kept in small, well-stoppered, completely filled, amber-colored bottles, protected from light and air." <U. S.

An assay process is given in the U. S. P. by which the percentage of benzaldehyde may be determined. It is the same as is directed under the title Benzaldehydum, which see.

This is a nitrogenized volatile oil obtained from bitter almond by moistening with water the cake left after expressing the fixed oil, and, after standing, distilling by means of steam. The substance obtained is benzyl-aldehyde, which is formed by the action of Emulsin on Amygdalin in the presence of water. Sp. gr. 1.045 to 1.060 at 25°C. (77°F.).

Nitrobenzol, or Oil of Mirbane, has been extensively manufactured as an artificial Oil of Bitter Almond, but only used for flavoring cheap soaps and coarse products, but now an artificial benzyl-aldehyde, which is identical with oil of bitter almonds is official in the U. S. P. It is made by the action of chlorine upon toluol (C_7H_8), the benzyl-chloride which is formed is distilled with lead nitrate and water in an atmosphere of carbonic acid gas, and benzyl-aldehyde results.

Uses. This oil is used chiefly as a flavoring. It is sedative and poisonous, except in very small quantities. The true oil of almond usually contains hydrocyanic acid.

Average dose.—0.03 Cc. ($\frac{1}{2}$ minim).

OLEUM ANETHI. Br. Oil of Dill.

An oil distilled from dill fruit and used for flavoring. It contains a terpine, Anethene, $C_{10}H_{16}$, having a lemon flavor and an oxygenated substance similar to carvol.

OLEUM ANISI. U. S., Br. Oil of Anise.

This oil is distilled in Europe from aniseed, *Pimpinella Anisum*, the Russian oil being most esteemed; and in China from star anise, *Illicium Anisatum*, the great majority of the commercial being from the later. It consists mainly of Anethol, $C_{10}H_{12}O$, of which one portion, Anise Camphor, congeals at ordinary temperature and is heavier than water, and the other, liquid Anethol, is lighter than water and remains liquid at a much lower temperature than the former. It also contains a small percentage of hydrocarbon, $C_{10}H_{16}$. Sp. gr. 0.975 to 0.985 at $25^{\circ}C$. ($77^{\circ}F$). Anise is used as a flavoring, sedative and carminative.

Average dose.—0.2 Cc. (3 minims).

OLEUM ANTHEMIDIS. Br. Oil of Chamomile.

This oil is distilled from chamomile flowers, and has their characteristic odor. Sp. gr. 0.905 to 0.915. It is stimulating and antispasmodic. The dose is 1 to 3 minims.

OLEUM AURANTII CORTICIS. U. S. Oil of Orange Peel.

Several varieties of orange yield a volatile oil from their peel, which is generally obtained by puncturing it with the ecuelle. The most common variety is obtained from the sweet orange and known as Oil of Orange or Oil of Sweet Orange. Sp. gr. 0.842 to 0.846 at $25^{\circ}C$. ($77^{\circ}F$). The common varieties of bitter orange yield an Oil of Bitter Orange, and a choice variety yields the Oil of Curaçoa. These oils have the same composition as terpene, $C_{10}H_{16}$, and are prone to change when exposed to light and air, acquiring a terebinthine odor. Oils that have developed this odor should not be dispensed or used. Orange oils are extensively used for flavoring and in making elixirs, colognes etc.

Average dose.—2 Cc. (3 minims).

OLEUM AURANTII FLORUM. Oil of Orange Flowers.**Oil of Neroli.**

This is a volatile oil distilled from orange flowers, and containing a fragrant terpene, $C_{10}H_{16}$. The choicest variety is distilled from the flowers of the sweet orange, and is known commercially as Oil of Neroli, Petale. The next best is obtained from the blossoms of the bitter orange, and known as Oil of Neroli, Bigarde; and an inferior

kind is made from the leaves and unripe fruit, known as Oil of Neroli, Petit grain.

Oil of neroli is obtained by distillation, and is taken from the surface of the distillate with a pipette, the aqueous residue being the orange flower water of commerce. Oil or otto of neroli is used in cologne and other perfumes.

OLEUM BETULÆ. U. S. Oil of Betula.

Volatile Oil of Sweet Birch.

A volatile oil obtained by maceration and distillation from the bark of the sweet birch, *Betula Lenta*, and nearly identical with oil of gaultheria. It is identical with Methyl Salicylate. Nearly all of the so called oil of wintergreen now sold is distilled from birch bark or made artificially

Average dose.—1 Cc. (15 minims).

OLEUM CADINUM. U. S., Br. Oil of Cade. Juniper Tar Oil.

"A product of the dry distillation of the wood of *Juniperus Oxycedrus*, Linné (Fam. Coniferæ)." < U. S.

"An empyreumatic oily liquid obtained by the destructive distillation of the woody portions of *Juniperus Oxycedrus*." < Br.

Sp. gr. about 0.990.

OLEUM CAJUPUTI. U. S., Br. Oil of Cajuput.

"A volatile oil distilled from the leaves of *Melaleuca Leucadendron*, Linné (Fam. Myrtaceæ); yielding, when assayed by the process given not less than 5.5 percent., by volume, of cineol." < U. S.

In composition it is a hydrate of the terpene Cajuputene, its formula being $C_{10}H_{16}H_2O$. It is a warm aromatic having an odor like camphor, and is used internally in cholera mixtures and externally in liniments.

Average dose.—0.5 Cc. (8 minims).

OLEUM CARI. U. S. Oleum Carui. Br.

A volatile oil distilled from caraway, consisting of a terpene, carvene, $C_{10}H_{10}$, and carvol, $C_{10}H_{11}$. In the market are two kinds; Oil of Caraway Seed and Oil of Caraway Chaff; the former being of much finer flavor and more expensive than the latter; it should always be used for flavoring. It is an aromatic oil used for flavoring and in making elixirs and some syrups, liquors etc.

Average dose.—0.2 Cc. (3 minims).

OLEUM CAROPHYLLI. U. S., Br. Oil of Cloves.

"A volatile oil distilled from cloves, yielding, when assayed by the process given, not less than 80 percent., by volume, of Eugenol." < U. S.

This oil consists of a light oil or terpene, $C_{10}H_{16}$, and Eugenol, $C_{10}H_{12}O_2$, in which the odor and taste of cloves is concentrated. It is a warm aromatic and antiseptic, much used for toothache and neuralgic pain, and is given internally in painkillers etc.

Average dose.—0.2 Cc. (3 minims).

OLEUM CHENOPODII. U. S. Oil of *Chenopodium*.

Oil of American Wormseed.

A volatile oil distilled from *chenopodium anthelminticum*, consisting of a terpene, $C_{10}H_{16}$, and an oxidized terpene, $C_{10}H_{16}O$. It is a peculiar, very disagreeably flavored oil, used as an anthelmintic. Some of the popular vermifuges are made chiefly of this oil, mixed with some bland oil and aromatics.

Average dose.—0.2 Cc. (3 minims).

OLEUM CINNAMOMI. U. S., Br. Oil of Cinnamon.

"A volatile oil distilled from Cassia Cinnamon (Fam. Lauracæ), yielding, when assayed by the process given, not less than 75 percent. by volume, of cinnamic aldehyde." < U. S.

"The oil distilled from Cinnamon bark." < Br.

Cinnamon oil contains cinnamic aldehyde, C_9H_8 . When old this is converted by oxidation into cinnamic acid, $C_9H_8O_2$, and it may be still further oxidized by the addition of nitric acid, yielding benzyl aldehyde (oil of bitter almonds) and benzoic acid, $C_7H_6O_2$. Oil of cinnamon is extensively used as a flavoring, and in medicine as a quick stimulant. Sp. gr. 1.045 to 1.055 at $25^\circ C$. ($77^\circ F$).

Average dose.—0.05 Cc. (1 minim).

OLEUM COPAIBÆ. U. S., Br. Oil of Copaiba.

A volatile oil distilled from copaiba, and consisting of hydrocarbons, $C_{10}H_{16}$ and $C_{15}H_{24}$. It is used for the same purposes as copaiba, but has no advantages over it. Sp. gr. 0.895 to 0.905 at $25^\circ C$. ($77^\circ F$), increasing with age.

Average dose.—0.5 Cc. (8 minims).

OLEUM CORIANDRI. U. S., Br. Oil of Coriander.

A volatile oil distilled from coriander, containing an oxygenated terpene, $C_{10}H_{16}O$. It is an agreeable aromatic and is considerably used in elixirs, syrups and carminative preparations. Sp. gr. 0.863 to 0.878 at $25^\circ C$. ($77^\circ F$).

Average dose.—0.2 Cc. (3 minims).

OLEUM CUBEBÆ. U. S., Br. Oil of Cubeb.

A volatile oil distilled from cubeb and consisting mainly of two oils, with different characteristics. Sp. gr. 0.905 to 0.925 at $25^\circ C$. ($77^\circ F$). It is a warm aromatic and stimulant, especially for the mucous mem-

brane, and is much used in medicines for catarrh and bronchitis, and in catarrh of the bladder.

Average dose.—0.5 Cc. (8 minims).

OLEUM ERIGERONTIS. U. S. Oil of Erigeron.

A volatile oil distilled from the fresh flowering herb of *Erigeron Canadense*, and consisting of a terpene and an oxygenated portion. Sp. gr. 0.845 to 0.865 at 25°C. (77°F.). It has a peculiar disagreeable odor, and is used in gonorrhœa and in the form of ointment or lotion, for piles etc.

OLEUM EUCALYPTI. U. S., Br. Oil of Eucalyptus.

"A volatile oil distilled from the fresh leaves of *Eucalyptus*, rectified by steam distillation, and yielding, when assayed by the process given, not less than 50 percent., by volume, of cineol (eucalyptol)." <U. S.

"The oil distilled from the fresh leaves of *Eucalyptus globulus*, *Labill.* and other species of *Eucalyptus*." <Br.

It consists chiefly of eucalyptol, $C_{10}H_{18}O$, and is an aromatic stimulant, having a camphoraceous spicy taste. Sp. gr. 0.905 to 0.925 at 25°C. (77°F.). It is used both internally and by inhalation for catarrh and bronchitis, and as an ingredient of liniments and ointments.

Average dose.—0.5 Cc. (8 minims).

OLEUM FŒNICULI. U. S. Oil of Fennel.

A volatile oil distilled from fennel and having much the same properties and composition as oil of anise. Sp. gr. 0.953 to 0.973 at 25°C. (77°F.). Average dose.—0.2 Cc. (3 minims).

OLEUM GAULTHERIÆ. U. S. Oil of Wintergreen.

A volatile oil, heavier than water, distilled from the leaves of *Gaultheria procumbens*, Linné (Fam. Ericaceæ), and rectified by steam distillation; containing about 90 percent. of methyl salicylate and 10 percent. of the terpene gaultherilene. Sp. gr. 1.172 to 1.180 at 25°C. (77°F.). A great portion of the oil of wintergreen found in the market is distilled from birch twigs and is, properly, Oil of *Betula*, which see. It is also artificially prepared from methyl alcohol and salicylic acid. A gaultherio-salicylic acid is prepared from oil of wintergreen which is much different in appearance from the commercial salicylic acid prepared from phenol. Oil of wintergreen is used for the preparation of true salicylic acid and is much employed as flavoring, which is also known as "chickerry."

Average dose.—1 Cc. (15 minims).

OLEUM HEDEOMÆ. U. S. Oil of Pennyroyal.

A volatile oil distilled from pennyroyal herb, similar in composition to the other mint oils. Sp. gr. 0.920 to 0.935 at 25°C. (77°F.). It is

used as a stimulant and flavoring, and in mixtures for preventing the bite of the fly, mosquito etc., and as an ingredient of liniments and ointments.

Average dose.—0.2 Cc. (3 minims).

OLEUM JUNIPERI. U. S., Br. Oil of Juniper.

The official oil of juniper should be distilled from full-grown, unripe fruit or berries, and consists mainly of a terpene, $C_{10}H_{16}$. Sp. gr. 0.860 to 0.880 at 25°C. (77°F.). It is used as a flavoring for some preparations and in medicine as a diuretic and stimulant. It is much used in the manufacture of cheap gin. Oil of Juniper Wood has more of a terebinthine odor, and is inferior.

Average dose.—0.2 Cc. (3 minims).

Empyreumatic Oil of Juniper or Oil of Cade is a tar-like liquid obtained from juniper by destructive distillation. It is frequently directed as "juniper tar."

OLEUM LAVENDULÆ FLORUM. U. S.

Oil of Lavender Flowers.

A volatile oil distilled from the flowering tops or whole herb of *Lavandula officinalis* (or vera, Br.), and consisting of terpene and oxygenated compounds. Sp. gr. 0.880 to 0.892 at 25°C. (77°F.). A great difference exists in the lavender oil found in the market, its fragrance varying with the part of the plant used, the oil of lavender flowers being the finest. It is much used in perfumery and somewhat employed in medicine. Average dose.—0.2 Cc. (3 minims).

The best Oil of Lavender Flowers produced is from the lavender cultivated at Mitcham, Eng.

OLEUM LIMONIS. U. S., Br. Oil of Lemon.

"A volatile oil obtained by expression from fresh Lemon Peel, yielding, when assayed by the process given, not less than 4 percent. of aldehyde, calculated as citral." <U. S.

This oil is obtained from fresh lemon peel, usually by means of the *écuelle*. Sp. gr. 0.851 to 0.855 at 25°C. (77°F.). It is extensively used as a flavoring and in cologne etc. This oil is composed chiefly of terpene and soon develops a terebinthine odor when exposed to the light and air. It, as well as oils of orange and bergamot, should be kept in a cool, dark place, closely stoppered in full bottles or cans. They may be somewhat restored when changed by washing repeatedly with hot water in which a few grains of permanganate of potassium are dissolved. When freshly received, if practicable, these oils should be put up in small bottles, full, and put away, or be mixed with one-fourth their weight of alcohol. Oil of lemon is seldom used in medicine except for flavoring.

Average dose.—0.2 Cc. (3 minims).

Oleum Limettæ. Oil of Limes. This is prepared from limes and is similar to oil of lemon. It is used in flavoring confectionery, syrups etc.

Oleum Linaloæ. Oil of Linaloa. This oil is distilled from a resinous exudate caused by the stings of insects on **Amyris Linaloæ**, found in Mexico. The odor of the oil somewhat resembles a mixture of lemon and lavender. It is used in perfumery and for scenting soaps.

OLEUM MACIDIS. Oil of Mace.

A volatile oil distilled from mace, and having the same properties as oil of nutmeg, which see.

OLEUM MENTHÆ PIPERITÆ. U. S., Br. Oil of Peppermint.

"A volatile oil distilled from the fresh or partly dried leaves and flowering tops of Peppermint, rectified by steam distillation, and yielding, when assayed by the process given, not less than 8 percent. of ester, calculated as Menthyl acetate, and not less than 50 percent. of total menthol (free and as ester)." <U. S.

"The oil distilled from the fresh flowering peppermint, *Mentha piperita*." <Br.

This oil consists of a light hydrocarbon, or ester, and Menthol, $C_{10}H_{20}O$, to which it owes its odor and medicinal properties. Sp. gr. 0.894 to 0.914 at 25°C. (77°F.). It is extensively used in medicine for flatulence and as a refrigerant, and for flavoring medicinal preparations. It is a favorite flavoring for confections, lozenges, candies, gums etc.

Average dose.—0.2 Cc. (3 minims).

Menthol. Peppermint Camphor. $C_{10}H_{20}O$. A stearepton obtained from peppermint oil by chilling it with ice, separating the solid portion, pressing, purifying and crystallizing. (See Menthol).

OLEUM MENTHÆ VIRIDIS. U. S., Br. Oil of Spearmint.

"A volatile oil distilled from fresh or partly dried leaves and flowering tops of spearmint, rectified by steam distillation." <U. S.

"The oil distilled from fresh flowering spearmint, *Mentha viridis*, Linn." <Br.

This oil consists of a terpene, $C_{10}H_{16}$, and an oxygenated portion, $C_{10}H_{14}O$, in which the characteristic odor resides. Sp. gr. 0.914 to 0.934 at 25°C. (77°F.). It was formerly much employed as a perfume for soaps but recently it has come to be a great favorite as a flavoring for lozenges and chewing gum. In medicine it is sometimes used as a flavoring for compounds and is considerably used in liniments and ointments. Internally it is useful as an ingredient of carminative and stimulating compounds.

Average dose.—0.2 Cc. (3 minims).

OLEUM MYRCIÆ. Oil of Bay. Bay Oil.

A volatile oil distilled from the leaves of *Myrcia Acris*, and consisting of a terpene, $C_{10}H_{16}$, and Eugenol, $C_{10}H_{12}O_2$.

It is chiefly used for making "bay rum," and in perfumery.

OLEUM MYRISTICÆ. U. S., Br. Oil of Nutmeg.

A volatile oil distilled from nutmeg, consisting of a terpene and oxygenated portion, which represents the flavor of the nutmeg. Sp. gr. 0.862 to 0.910 at 25°C. (77°F.).

It is used chiefly for flavoring and in some elixirs. It is carminative and stimulating and is similar to Oil of Mace.

Average dose.—0.2 Cc. (3 minims).

OLEUM PICIS LIQUIDÆ. U. S. Oil of Tar.

A volatile oil distilled from tar, containing a variety of constituents. When first distilled this oil is nearly colorless but is soon acquires a reddish-brown color. It has a strong tarry odor and taste, and has sp. gr. about 0.965 at 25°C. (77°F.). It is preferable for many medicinal purposes to tar and is used in making several official syrups etc., and in cough remedies. It is also used in liniments and ointments as an antiseptic and stimulant.

This official Oil of Tar is entirely unlike the commercial compound formerly sold as "oil of tar," but which under the new government pure food and drugs law is labeled "Cable Oil."

An Oil of Birch Tar is made from birch tar by distillation.

Average dose.—0.2 Cc. (3 minims).

OLEUM PIMENTÆ. U. S., Br.**Oil of Pimenta. U. S. Oil of Pimento. Br.**

"A volatile oil distilled from *Pimenta*, yielding, when assayed by the process given, not less than 65 percent., by volume, of eugenol." <U. S. Sp. gr. 1.033 to 1.048 at 25°C. (77°F.).

It is similar in characteristics to oil of cloves, and is considerably used in flavoring.

Average dose.—0.2 Cc. (3 minims).

OLEUM PINI. Br. Oil of Pine.

An oil distilled from the fresh leaves of *Pinus Pumilio*, having the characteristic odor of pine leaves and consisting mainly of terpenes. Sp. gr. 0.865 to 0.870 at N. T. It may be used in making cough preparations etc.

This oil is generally labeled Oil *Pinus Pumilio*, to distinguish it from ordinary Oil of Pine Needles, which is also found on the market.

OLEUM ROSÆ. U. S., Br. Oil of Rose. Otto of Rose.

"A volatile oil distilled from the fresh flowers of *Rosa damascena*, Mueller (Fam. Rosaceæ); having, when assayed by the process given, a saponification value of not less than 10 nor more than 17. It should be kept in well-stoppered, amber-colored vials, in a cool place, protected from light. When dispensed it should be completely liquified by warming, if necessary, and well mixed by agitation." <U. S.

"An oil distilled from the fresh flowers of *Rosa damascena*." <Br.

This oil consists of a liquid portion and a stearopten and is solid or semi-solid at ordinary temperatures. Sp. gr. 0.855 to 0.865 at 25°C. (77°F.). The best otto of rose is obtained from Turkey, Kizanlic being the chief collecting center. Oil of rose is used in pharmacy for many purposes and is extensively employed in perfumes.

OLEUM ROSMARINI. U. S., Br. Oil of Rosemary.

"A volatile oil distilled from the fresh flowering tops of *Rosmarinus officinalis*, Linné (Fam. Labiatæ); yielding, when assayed by the process given, not less than 5 percent. of ester, calculated as bornyl acetate, and not less than 15 percent. of total borneol." <U. S.

"An oil distilled from the flowering tops of *Rosmarinus officinalis*." <Br.

This oil consists of a terpene and oxygenated compounds. Sp. gr. 0.984 to 0.912 at 25°C. (77°F.).

It is used in liniments and ointments as an aromatic and stimulant, and is somewhat employed as an antiseptic and stimulant.

Average dose.—0.2 Cc. (3 minims).

OLEUM RUSCI. Empyreumatic Oil of Birch.

This is properly Oil of Birch Tar, obtained by distilling the tar from the birch. It gives the peculiar flavor to Russian leather, and is somewhat used in perfumery.

OLEUM RUTÆ. Oil of Rue.

A volatile oil distilled from *Ruta Graveolens*; the most soluble in water of official oils. It is given for colic, female disorders etc., in doses of 2 to 5 minims.

OLEUM SABINÆ. U. S. Oil of Savin.

A volatile oil distilled from the fresh tops of *savine*. Sp. gr. 0.903 to 0.923 at 25°C. (77°F.). It is a terpene and has the same general properties as *savine*; acting as a stimulant to the organs of generation. It is sometimes given as an abortive.

Average dose.—0.05 Cc. (1 minim).

OLEUM SANTALI. U. S. Oil of Santal.**Oil of Sandal Wood. Br.**

"A volatile oil distilled from the wood of *Santalum album*, Linné (Fam. *Santalaceæ*); yielding, when assayed by the process given, not less than 90 percent. of alcohols calculated as santalol." <U. S.

"An oil distilled from the wood of *Santalum album*." <Br.

Sp. gr. 0.965 to 0.975 at 25°C. (77°F.).

This oil consists of several oxygenated compounds of hydro-carbons. It is similar in its medicinal action to copaiba and is employed as a stimulant for the mucous membrane for gonorrhœa and catarrhal conditions of the bladder and urinary tract. It has also been used in perfumery to give permanence to odors.

Average dose.—0.5 Cc. (8 minims).

OLEUM SASSAFRAS. U. S. Oil of Sassafras.

A volatile oil distilled from the bark of sassafras root, and consisting of a terpene, safrene, $C_{10}H_{16}$; and an oxygenated portion, safrol, $C_{10}H_{10}O_2$; which constitutes about 90 percent. of the oil. Sp. gr. 1.065 to 1.075 at 25°C. (77°F.). This oil is an agreeable aromatic, largely used in liniments and pain-killers, also as a flavoring. When compounded with wintergreen and anise it makes the sarsaparilla flavoring so much used.

Average dose.—0.2 Cc. (3 minims).

OLEUM SINAPIS VOLATILE. U. S., Br.**Volatile Oil of Mustard.**

"A volatile oil obtained from Black Mustard (freed from fatty oils) by maceration with water and subsequent distillation, yielding, when assayed by the process given, not less than 92 percent. of allyl iso-thiocyanate. It should be carefully kept in well-stoppered, amber-colored bottles in a cool place protected from light." <U. S.

"Distilled from Black Mustard Seeds after maceration with water." <Br.

This is a sulphurated oil, known chemically as Allyl Sulphocyanide. Sp. gr. 1.013 to 1.020 at 25°C. (77°F.). It is heavier than water and has a very pungent, acrid odor. Mixed with alcohol or oils in liniment it is used as a counter-irritant and rubefacient and inhalent.

Average dose.—0.008 Cc. ($\frac{1}{8}$ minim).

OLEUM SUCCINI. Oil of Amber.

A volatile oil obtained by the destructive distillation of amber, and subsequently purified by rectification. This is called rectified oil of amber, the unpurified oil being the crude. It is considerably used in liniments as an irritant and stimulant, and has the same composition as oil of turpentine. Not used internally.

OLEUM TEREBINTHINÆ. U. S., Br. Oil of Turpentine.

A volatile oil recently distilled from turpentine, and having the composition $C_{10}H_{16}$. It is a type of the terpenes. It is familiarly known as "turpentine" or "Spirits of Turpentine," and is extensively used in the arts and medicine. It is an ingredient of most of the proprietary liniments and is a valuable stimulant and rubefacient. It is much employed as a solvent for resins etc. In medicine only the purified oil is directed for internal administration.

Terebene is a light hydrocarbon obtained from oil of turpentine by mixing it with $\frac{1}{20}$ its weight of sulphuric acid, and distilling over at $160^{\circ}F$. It is used for coughs etc.

An oil is distilled from Strassburg Turpentine and also from Venice Turpentine.

OLEUM TEREBINTHINÆ RECTIFICATUM. U. S.**Rectified Oil of Turpentine.**

Oil of Turpentine, a convenient quantity,

Solution of Sodium Hydroxide, a sufficient quantity.

"Shake the oil of turpentine thoroughly with an equal volume of solution of sodium hydroxide, and introduce the mixture into a copper still connected with a well-cooled condenser. Recover about three-fourths of the oil by distillation, separate the clear oil from the water, and filter.

Rectified oil of turpentine should always be dispensed when oil of turpentine is required for internal use." < U. S.

Sp. gr. 0.860 to 0.865 at $25^{\circ}C$. ($77^{\circ}F$).

Average dose.—1 Cc. (15 minims).

OLEUM THYMI. U. S. Oil of Thyme.

"A volatile oil distilled from the leaves and the flowering tops of *Thymus vulgaris*, Linné (Fam. Labiatæ), and containing, when assayed by the process given, not less than 20 percent., by volume, of phenols." < U. S.

Oleum Serpylli, distilled from *Thymus Serpyllum*, is official in several of the European pharmacopœias.

Oil of thyme is composed of cymene, $C_{10}H_{14}$; thymene, $C_{10}H_{16}$; and thymol, $C_{10}H_{14}O$; a stearopten, which crystallizes. This oil is extensively used in liniments and as a stimulant and rubefacient. As found in the market it is frequently adulterated with oil of turpentine or other dilutents. Red oil of thyme is known as Pure Origanum Oil, and white oil of thyme is used in perfumery.

Average dose.—0.2 Cc. (3 minims).

Oil of Origanum, Commercial. This is a mixture of red oil of thyme with oil of turpentine, equal parts, for a good quality; or 1 part of the former with 2 parts of the latter for a common oil of origanum, such

as is used in liniments. Druggists can buy the pure red oil of thyme and dilute it as they please for the cheaper grades.

Thymol. $C_{10}H_{13}HO$. A stearopten obtained from various species of oil of thyme by saponifying with caustic soda, separating the saponaceous substance and decomposing with hydrochloric acid, washing the crystalline mass with water, dissolving in hot alcohol and recrystallizing. It is used as an antiseptic and also for neuralgia, toothache etc. It is official in the U. S. P. and Br. P.

OLEUM VALERIANÆ. Oil of Valerian.

A volatile oil distilled from valerian, consisting of a terpene and an oxygenated compound, having the characteristic odor and taste of valerian. It is employed for making valerianic acid and is sometimes used in medicine.

Other Volatile Oils.

Besides the foregoing volatile oils, which are mostly official, many others are used in pharmacy. They are generally described in the *Materia Medica* section, Part I., under the name of the drug from which they are obtained, and are also listed in the index.

MINERAL OILS.

The name "mineral oils" is intended to apply to the hydrocarbon oils which are obtained from the distillation of coal, and the oils obtained from the earth by drilling or otherwise. The mineral oil formerly used for illuminating, and obtained by distillation from coal and other bituminous substances was known as coal oil or kerosene, but the discovery of petroleum oil revolutionized that industry, and our illuminating oils are now almost entirely obtained by distillation from crude petroleum, or "crude oil," which is obtained from wells in different parts of the world. The illuminating oil is obtained by fractional distillation, and is familiarly known as "carbon oil," or "kerosene oil." The crude oil is used in liniments, and as an application for rheumatism etc. (See Petroleum).

Lubricating oils are also made from the heavier portions of petroleum, and are frequently mixed for that purpose with animal or vegetable oils.

Paraffin oils are obtained from petroleum, after distilling the illuminating oil, by chilling the residue and pressing the solid paraffines obtained. They are used extensively for lubricating, and, when purified, for various pharmaceutical purposes, make a good body for an oil liniment, for hair oil etc.

Seneka Oil. This is a variety of crude petroleum oil which was formerly obtained from the surface of some streams by the Seneka Indians, who absorbed it with woolen blankets and then obtained it by wringing them out. Crude petroleum oil, which has stood exposed in shallow vessels for some time, is very similar to it and is now used altogether when Seneka oil is required.

Rock Oil and **Oil of Stone** are very similar, and old crude petroleum is altogether sold for them now.

Barbados Tar is a thick petroleum, resembling thin tar, exuding from the earth, and obtained from Barbados and other countries. Its properties are similar to other heavy petroleum. It is used as an application for rheumatism and in liniments etc.

MIXED OILS.

Under this heading are included such preparations of oils as cannot well be classified elsewhere, but for which there is a demand and use:

Acoustic Oil. Oil of almonds 6 parts, oil of turpentine 1 part. Mix. Used for deafness etc.

British Oil. Oil of origanum 1 drachm, oil of rosemary 1 drachm, Barbados tar 2 fl.ounces, oil of turpentine 5 fl.ounces. Mix them. Used as an application and also internally.

Harlem Oil. Oil of amber, crude, $1\frac{1}{2}$ drachms; crude petroleum 1 drachm, sulphurated oil, balsam of sulphur, each, 3 drachms; linseed oil 4 drachms, oil of turpentine 1 ounce. Mix them. This celebrated oil is used internally and externally for everything.

Oil of Spike. The oil of spike which is usually sold and dispensed for liniments is a mixture composed of Barbados tar and oil of turpentine, and may have mixed with it a little oil of thyme. The proportions vary somewhat as produced by various houses. Oil of turpentine 3 pints, Barbados tar 1 pint, makes about the average mixture. This mixed oil should not be confounded with the oil distilled from *Lavendula Spica*, which is sold as oil of origanum.

Oil of Rhodium, factitious. The true oil of rhodium is distilled from rhodium wood, but what appears in the market is generally made by mixing otto of rose with oil of santal wood or balsam of copaiba, about 1 part of the former to 20 of the latter. It is considerably sold as a scent for hunting bees, and is used in perfumes.

Oil of Ambergris and Oil of Musk are made by digesting 2 drachms of ambergris or musk for some time in 20 fl.ounces of purified almond oil.

Oil of Benzoin and Oil of Styrax and other oils of gums, balsams or resins, are made by digesting 1 ounce of the substance with a pint of purified oil, either almond, benne or olive.

Fatty Oils. Oil of jasmine, hyacinth, jonquil, tuberose, violet and of many other delicate flowers may be made by digesting the fresh flowers with the purified oil, and changing the flowers several times for fresh ones, until the oil is highly perfumed with the odors of the flowers.

Macerated Oils. Medicinal oils are prepared by macerating fresh herbs, as belladonna, bittersweet, conium, hyoscyamus, stramonium, hamamelis etc., 1 part, in olive oil 2 parts, with heat, then expressing.

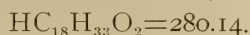
A macerated oil prepared in this manner is called *Oleum Coctum*—followed by the name of the drug from which it is prepared.

OLEATA — OLEATES.

Oleates are liquid, semi-solid, or solid preparations, made by combining basic substances with oleic acid. The official oleates are liquid, but the name oleate is used in pharmacy to designate a salt, which may be either liquid or solid, produced by the combination of oleic acid with metals or alkaloids.

The oleates are employed in medicine as a means of applying medicinal agents externally, as they are thought to be more readily absorbed than ointments. The following are those official in the U. S. and Br. P.

ACIDUM OLEICUM. U. S., Br. Oleic Acid.



Oleic acid, which is the acid base of the oleates, is obtained from fats. Crude oleic acid is called "red oil," the refined is a light amber color. This acid combines with metallic bases and alkaloids in the same manner as other acids, forming the salts called oleates. The liquid oleates, which are used as applications, are solutions containing oleic acid in large excess, but the solid and dry oleates which have been precipitated from solutions of metals by soluble oleates, are satisfied chemical combinations. They may be mixed with oleic acid to form liquid oleates.

OLEATUM ATROPINÆ. U. S. Oleate of Atropine.

Atropine,	2 Gm. or 31 grains
Alcohol,	2 Cc. or 33 minims
Oleic Acid,	50 Gm. or 772 grains
Olive Oil, sufficient,	
To make	100 Gm. or 3 oz. av.+230 grains

The atropine is to be placed in a tared mortar with the alcohol and an equal volume of oleic acid added, and, after warming the mortar, stirred until the alcohol has evaporated; the remainder of the oleic acid is then to be added with continued stirring until the atropine is dissolved; and then sufficient olive oil added to make the product weigh 100 Gm. (or 3 ounces av.+230 grains).

This is used for neuralgia to allay pain, and may be employed in treatment of the eyes for certain purposes.

OLEATUM COCAINÆ. U. S. Oleate of Cocaine.

Cocaine,	5 Gm. or 77 grains
Alcohol,	5 Cc. or 81 minims
Oleic Acid,	50 Gm. or 772 grains
Olive Oil, sufficient,	

To make 100 Gm. or 3 oz. av.+230 grains

The cocaine is to be triturated in a tared mortar with the alcohol, and an equal volume of oleic acid added; after warming the mortar the mixture is to be stirred until the alcohol has evaporated, then the remainder of the oleic acid is added with continued stirring, and enough olive oil to make the product weigh 100 Gm. (or 3 oz. av.+230 grains).

This oleate may be employed to allay pain and in some cases, where slow and prolonged action is required, as a local anæsthetic.

OLEATUM HYDRARGYRI. U. S., Oleate of Mercury.

The U. S. formula is:

Yellow Mercuric Oxide,

in very fine powder, 25 Gm. or 386 grains

Distilled Water, 25 Cc. or 406 minims

Oleic Acid, sufficient

To make

100 Gm. or 3 oz. av.+230 grains

The yellow mercuric oxide is to be triturated with the distilled water in a tared mortar; oleic acid 70 Gm. (or 2 oz. av.+205 grains) is to be added and thoroughly mixed. The mortar is then to be warmed to a temperature not exceeding 50°C. (122°F.), and the mixture stirred occasionally until the water is evaporated; sufficient oleic acid is then to be added, if necessary, to make the product weigh 100 Gm. (or 3 ounces av.+230 grains). Avoid contact with metallic utensils; preserve the oleate in tightly stoppered bottles.

This oleate has met with considerable favor as an application, because of its ready absorption, and is now much used where mercurial ointment was formerly employed.

See also Hydrargyri Oleas, Br.

OLEATUM QUININÆ. U. S. Oleate of Quinine.

Quinine, 25 Gm. or $\frac{3}{4}$ ounce

Oleic Acid, 75 Gm. or $\frac{3}{4}$ ounce

To make

100 Gm. or 1 ounce

The quinine is to be triturated in a warm mortar with a small quantity of the oleic acid, to a smooth paste. The remainder of the oleic acid, previously warmed, is then to be added, and the mixture stirred until the quinine is dissolved.

This preparation is desirable where an outward application of quinine is of advantage, in neuralgias, sciatica etc. It is readily absorbed.

OLEATUM VERATRINÆ. U. S. Oleate of Veratrine.

Veratrine, 2 Gm. or 31 grains

Oleic Acid, 50 Gm. or 772 grains

Olive Oil, sufficient,

To make

10 Gm. or 3 oz. av.+230 grains

The veratrine is to be triturated in a tared mortar with about 5 Cc. (or 80 minims) of olive oil, and, after warming the mortar, the oleic acid is to be added, with continued stirring, until the veratrine is dissolved. Sufficient olive oil is then to be added to make the product weigh 100 Gm. (or 3 oz. av.+230 grains).

This oleate is employed as an application for neuralgia and rheumatic pain. It is readily absorbed and quite effective.

Other Oleates.

Aconitine Oleate. This is prepared with aconitine 2 parts rubbed with 98 parts of warm oleic acid, making a 2 percent. oleate. Used locally as an anodyne for neuralgia, pain etc.

Copper Oleate. This is prepared by rubbing copper oxide 5 parts with warm oleic acid 95 parts. It should be warmed when used.

Oleate of Morphine. This oleate is official in the Mex. Ph. and may be made either 2, 5, or 10 percent. strength of morphine alkaloid in oleic acid.

Oleates of Metals. A number of oleates of metals are prepared and used in pharmacy. They may be made in a similar manner as the Oleate of Zinc which is official in the U. S. P.

Most of the oleates of metals are prepared by precipitating a solution of some soluble salt of the metal with a solution of sodium oleate prepared by dissolving 1 ounce of castile soap in 16 ounces of water. A number of such oleates are official in the Mex. Ph. and may be advantageously used in medicine.

Oleate of Strychnine. This oleate is official in the Mex. Ph. and is usually made 2 percent. of strychnine alkaloid with oleic acid.

OLEORESINÆ — OLEORESINS.

Considered as galenicals, oleoresins are preparations made from vegetable drugs, containing oleo-resinous principles, by exhausting the drug of these principles with some etherial solvent, and then concentrating by distillation or evaporation until only the oleoresin remains. There are also natural oleoresins, exudates from trees, which are known as turpentine, balsams and gums. In the earlier pharmacopœias of this country some of the preparations now known as oleoresins were called fluid extracts, and some of them are now classed with the extracts and liquid extracts in other countries. The prepared oleoresins are used in pharmacy in pills, tablets, capsules and other forms when concentrated principles of the kind are desired.

In the present revision of the U. S. P. an important change has been made in all of the oleoresins. In all but one acetone is now directed to be used as the extractive menstruum instead of ether, as in the former revision, and in the one (*Oleoresina Cubebæ*), alcohol is used instead of ether. The use of acetone is advantageous in the way of economy, and it is an excellent solvent for oleoresinous constituents of the drugs from which the oleoresins are prepared. It is also much less volatile than ether and percolation may be conducted with it in the ordinary way with but little loss of menstruum.

The following are the formulas of the U. S. P.:

OLEORESINA ASPIDIUM. U. S. Oleoresin of Aspidium.

(Commonly called Extract of Male Fern).

The U. S. formula is now:

Aspidium, recently reduced

to No. 40 powder,

500 Gm. or 16 ounces

Acetone, a sufficient quantity.

The aspidium is to be packed in a glass cylindrical percolator, provided with a stop-cock and arranged with a cover and a receptical suit-

able for volatile liquids, and acetone added in successive portions, percolating slowly until the drug is exhausted. The greater part of the acetone is then to be removed from the percolate by distillation on a water-bath, and the residue transferred to a shallow vessel and set aside in a warm place where the remaining acetone may evaporate spontaneously. The oleoresin is to be kept in a well-stoppered bottle.

"Note.—The oleoresin of aspidium deposits on standing, a granular crystalline substance. This should be thoroughly mixed with the liquid substance before dispensing.

Average dose.—2 Gm. (30 grains).

In the Br. P. this is known as *Extractum Filicis Liquidum*, Liquid Extract of Male Fern. It is prepared with ether as a menstruum in the same manner as was formerly official in the U. S. P.

"Exhaust Male Fern Rhizome, in No. 20 powder, with ether, by percolation; evaporate the ether from the clear percolate on a water-bath or by distillation, until an oily extract remains." < Br.

In other foreign pharmacopœias the method and formula for making are similar to the Br., and the preparations are mostly known as Extract of Male Fern, or Oil of Male Fern.

OLEORESINA CAPSICI. U. S. Oleoresin of Capsicum.

Capsicum, in No. 40 powder, 550 Gm. or 16 ounces
Acetone, a sufficient quantity.

The capsicum is to be percolated with the acetone and the oleoresin made in the same manner as is directed for the foregoing. When the acetone has entirely evaporated, the liquid part of the oleoresin is to be poured off, and the residue transferred to a glass funnel, provided with a pledget of cotton, and when the separated fatty matter (which is to be rejected) has been completely drained, the liquid portions are to be mixed together. Keep the oleoresin in a well-stoppered bottle. This is sometimes called Oil of Capsicum.

Average dose.—0.030 Gm.=30 milligrammes ($\frac{1}{2}$ grain).

OLEORESINA CUBEBA. U. S. Oleoresin of Cubeb.

Cubeb, in No. 30 powder, 500 Gm. or 16 ounces
Alcohol, a sufficient quantity.

The cubeb is to be percolated slowly with alcohol added in successive portions, until the drug is exhausted. The greater part of the alcohol may be recovered by distillation on a water-bath; the residue is to be evaporated with constant stirring, in a warm place, until the alcohol is all vaporized. Keep the oleoresin in a well-stoppered bottle.

"Note. Oleoresin of Cubeb deposits, after standing for some time, a waxy and crystalline matter, which should be rejected, the liquid portion only being used."

Average dose.—0.500 Gm.=500 milligrammes ($7\frac{1}{2}$ grains).

OLEORESINA LUPULINI. U. S. Oleoresin of Lupulin.

Lupulin, .500 Gm. or 16 ounces av.

Acetone, a sufficient quantity.

An oleoresin is to be made in the same manner as oleoresin of aspidium.

Average dose.—0.200 Gm.=200 milligrammes (3 grains).

OLEORESINA PIPERIS. Oleoresin of Pepper.

Pepper, in No. 40 powder, 500 Gm. or 16 ounces av.

Acetone, a sufficient quantity.

An oleoresin is to be made in the same manner as oleoresin of aspidium; and lastly the oleoresin is to be separated from the crystals of piperin in the same manner as is directed in the formula for oleoresin of capsicum. This is commonly called Oil of Black Pepper.

Average dose.—0.030 Gm.=30 milligrammes ($\frac{1}{2}$ grain).

OLEORESINA ZINGIBERIS. U. S. Oleoresin of Ginger.

Ginger, in No. 60 powder, 500 Gm. or 16 ounces av.

Acetone, a sufficient quantity.

An oleoresin is to be made in the same manner as oleoresin of aspidium.

Average dose.—0.030 Gm.=30 milligrammes ($\frac{1}{2}$ grain).

Other Oleo-Resins.

Besides the foregoing oleo-resins, many others may be obtained from plants containing oleo-resinous principles, as allspice, Canada snake root, horse chestnut, lobelia, savin etc., but they are seldom used. They are generally mentioned in the Organic Materia Medica section, Part I., and are referred to in the index. They may be made in the same manner as the official preparations. Asclepidin, cypripedin, iridin, senecin and xanthoxylin are oleo-resins prepared by eclectic manufacturing pharmacists.

Natural Oleo-Resins.

The natural oleo-resins are not included in a class in the pharmacopœias, but are described under their trade name or title. In the U. S. P. three only are official and they will be further considered in their alphabetical order.

Official Natural Oleo-Resins.

Copaiba. Balsam of Copaiba. Two varieties of balsam of copaiba are found in the market; the Para, which is thin, and contains a larger portion of oil; and the Angostura, which is thicker, and contains more resin. The former is generally preferred. (See Copaiba).

Terebinthina. Turpentine. Gum Turpentine. A concrete oleo-resin obtained from several species of pine, and when freshly gathered, commonly called pine pitch. It is the source of oil of turpentine ("spirits of turpentine"), of which it contains about 25 percent., and of resin or "rosin," which is the residue left after distillation. (See Terebinthina).

Terebinthina Canadensis. Canada Turpentine. Balsam of Fir. A liquid oleo-resin obtained from the Canada balsam tree, by puncturing the vesicles in the bark. It is commonly called "balsam fir," and is much employed in the arts and in pharmacy. (See Terebinthina Canadensis).

Other Oleo-Resinous Substances.

Besides the foregoing official natural oleo-resins, a few others, which are known commercially as balsams, gums and turpentines, are mentioned.

China Turpentine. An oleo-resin or turpentine obtained from incisions made in the bark of *Pictacia Terebinthus*, and recently considerably used in medicine.

Elemi. A concrete oleo-resin obtained from *Canarium Commune*, and containing about 10 percent. of a volatile oil and 25 percent. of resin.

Gurjun Balsam. An oleo-resin consisting of volatile oil and resin, obtained from *Dipterocarpus Turbinatus*, somewhat similar to *cobaiba*, and used for similar purposes. It is also called *Wood Oil*.

Hungarian Turpentine or Balsam. An oleo-resinous exudation from the branches of *Pinus Pumilia*. Its composition and uses are similar to balsam of fir.

Oregon Balsam Fir. An oleo-resin obtained from Oregon balsam pine, *Abies Menziessi*, Linné. This closely resembles balsam fir and is used as a substitute for it for many purposes. It contains a larger proportion of resin, and does not remain fluid so long as the Canada balsam.

Strassburg Turpentine. An oleo-resin obtained, like balsam of fir, by puncturing the ducts of the bark of *Abies pectinata*. Its composition and uses are similar to balsam of fir.

Venice Turpentine. An oleo-resinous exudation from the heart-wood of *Larix Europæa*. Its composition and uses are similar to balsam of fir.

OPII PULVIS. U. S. Powdered Opium.

"Opium dried at a temperature not exceeding 85°C. (185°F.), and reduced to a very fine powder. Powdered opium for pharmaceutical purposes, when assayed by the process given under opium, should not yield less than 12 percent., nor more than 12½ percent. of crystallized morphine. Powdered opium of a higher percentage may be brought within these limits by admixture with powdered opium of a lower percentage or powdered sugar of milk, in proper proportions." <U. S.

Average dose.—0.065 Gm.=65 milligrammes (1 grain).

OPIUM. U. S., Br.

"The concrete milky exudation obtained by incising the unripe capsules of *Papaver Somniferum*, Linné (Fam. *Papaveraciæ*), and yielding, in its moist condition, not less than 9 percent. of crystallized morphine, when assayed by the process given." <U. S.

This is obtained from the opium poppy, grown in Asia Minor. A few days after the petals have fallen incisions are made in the capsule, and in 12 to 15 hours the milky exudation which has collected is scraped off and collected and afterwards formed into masses as it appears on the market. The present U. S. P. specifies that in its normal moist condition it should yield at least 9 percent. of morphine when assayed by the official process. The best grades of opium frequently contain as high as 20 percent. or even more of morphine, and a good average quality should yield when dried, 15 to 17 percent. In pharmacy opium is used for making many preparations, and is the source of many alkaloids and alkaloidal salts, which are extensively used. In medicine opium and its preparations are more frequently employed than any other drug except, perhaps, the preparations of cinchona.

Opium and its preparations are mostly sedative and anodyne, and are used to allay pain, quiet excited nervous action, induce sleep etc. The use of opium and morphine—although almost indispensable in medicine—is attended with great risk of forming the opium habit, and physicians cannot be too cautious in employing them. They are good servants, but bad masters.

Average dose.—0.100 Gm.=100 milligrammes ($1\frac{1}{2}$ grains).

Pure Food and Drugs Law. All forms of opium and all preparations containing it are subject to the U. S. Pure Food and Drug Law and their labels must state the quantity of opium contained in each ounce of any preparation intended for inter-state commerce. This also applies to its derivative, Codeine, all of its salts, and preparations containing them.

OPIMUM DEODORATUM. U. S. Deodorized Opium.

Powdered Opium,

500 Gm.

Purified Petroleum Benzin, a sufficient quantity.

The opium is to be macerated for 24 hours in a wide-mouthed, well-closed bottle, with sufficient purified benzin to completely cover it, shaking occasionally. The liquid is then to be decanted as closely as possible and another portion of purified petroleum benzin poured upon it and the treatment repeated in the same manner. After 24 hours the liquid is to be decanted as before and the remaining contents of the bottle poured upon a plaited filter, contained in a glass funnel, which should be well covered. Allow this to drain and percolate with purified petroleum ether until the percolate passes without color. Finally the filter containing the depurated opium is to be removed from the funnel and the powder exposed to the open air until it is thoroughly dried.

"Deodorized opium should be kept in well-stoppered bottles, and, when assayed by the process given under opium, should yield not less than 12 percent., nor more than $12\frac{1}{2}$ percent. of crystallized morphine. Opium in coarser powder may be deodorized in the same manner."
<U. S.

Uses. This may be used in powder the same as opium or for making deodorized tincture of opium, the same quantity as is directed of granulated opium, and in the same manner as ordinary tincture of opium is made. Being already deodorized it does not require treatment with petroleum benzin in making the tincture.

Average dose.—0.065 Gm.=65 milligrammes (1 grain).

OPIMUM GRANULATUM. U. S. Granulated Opium.

"Opium dried at a temperature not exceeding 85°C . (185°F .), and reduced to a coarse (No. 20) powder."

"Granulated opium, when assayed by the process given under opium, should yield not less than 12 percent., nor more than $12\frac{1}{2}$ percent., of crystallized morphine. Granulated opium of a higher per-

centage may be brought within these limits by admixture with granulated opium of a lower percentage in proper proportions." < U. S.

Average dose.—0.065 Gm.=65 milligrammes (1 grain).

ALKALOIDS AND PRINCIPLES OF OPIUM.

Apomorphine. Emetic. From morphine.
 Apocodeine. Sedative. From codeine.
 Codeine. Sedative. 0.678% in opium.
 Codamine. Sedative.
 Cotarine. From narcotine.
 Cryptopine. Narcotic.
 Deuterotine. Narcotic.
 Dionine. Ethyl-morphine. Analgesic from morphine.
 Gnoscopine.
 Heroin. Diacetyl-morphine. Anodyne from morphine.
 Hydrocotarine.
 Lanthropine.
 Laudanine.
 Laudanosine.
 Meconidine. 0.804% in opium.
 Morphine. Anodyne. 10.842% in opium.
 Narceine. Narcotic. 0.662% in opium.
 Narcotine. Narcotic. 6.808% in opium.
 Oxynarcotine. Narcotic. From narcotine.
 Papaverine. Narcotic.
 Paramorphine. Sedative. From morphine.
 Peronine. Benzyl-morphine. Sedative from morphine.
 Protopine.
 Pseudomorphine. Sedative. From morphine.
 Rhœadine.
 Thebaine.
 Meconic Acid. 5.154% in opium.
 Meconin.
 Meconoisin.

In addition to the foregoing constituents of opium it contains in 100 parts; resin, 3.582; gummy matter, 26.242; mucus, 19.086; fatty matter, 2.166; caoutchouc, 6.012 and water, 9.846.

The principal alkaloids of opium and their salts which are used in medicine are noted under other headings, as Morphina, Codeina etc. The following are also somewhat used:

Meconidina. Meconidine. This alkaloid found in opium is readily obtained by precipitating a solution of meconic acid with an alkali, washing and drying the precipitate. It is not used in medicine, but is of interest as the base of the meconic principle in opium.

Narceina. Narceine. Another alkaloid of opium much resembling morphine, but more soluble, is obtained from the mother liquid after the crystallization of morphine. It is narcotic and may be given in doses of $\frac{1}{4}$ to $\frac{1}{2}$ grain.

Papaverine. An alkaloid obtained from the aqueous infusion of opium, and having sedative, without narcotic properties. Dose $\frac{1}{12}$ to $\frac{1}{4}$ grain.

ORTHOFORM.

This name is given to the methyl ester of metaamidoparaoxybenzoic acid. It is a bulky, white, tasteless powder, slightly soluble in water, soluble in 6 parts of alcohol and in collodion. Its solution in collodion is used as a paint for wounds, ulcers and affected surfaces. It is anesthetic and antiseptic. In the form of ointment and dusting powder, 5 to 20 percent., it is used for irritated surfaces, wounds, sores etc. Internally the dose is 5 to 15 grains.

OXYGENIUM — OXYGEN.

Symbol O; Atomic weight 16 ($H=1$. 15.96); Sp. gr. 1.10.

Oxygen is a gaseous element, transparent, colorless, odorless, and tasteless, about 16 times the weight of hydrogen. In a free state it constitutes about one-fifth of the volume of the atmosphere. Combined with hydrogen it forms about eight-ninths of the weight of water, and in this combination and union with other elements it constitutes a large proportion of all animal and vegetable, as well as mineral matter, forming, it is estimated, fully one-half the solid crust of the earth.

It supports combustion and unites with all other elements except fluorine (with which it is not known to combine), forming oxides. With many of the elements it unites in more than one proportion, its combinations being then known as monoxides, di- deut or binoxides, ter- or trioxides, tetroxides and pentoxides, as they combine with 1, 2, 3, 4 or 5 volumes of oxygen.

Oxides which are reduced from hydrates by depriving them of the elements of water, without otherwise changing their composition, are frequently called anhydrides. In combination with hydrogen oxygen unites with many positive bases, forming hydrates or hydroxides.

Oxygen is most readily obtained for experimental purposes by heating potassium chlorate with about one-eighth its weight of black oxide of manganese in a flask, and collecting the gas.

The combinations of oxygen with bases are noted under the basic substance with which it combines.

Oxidation is the operation by which oxygen combines with other substances, forming oxides. The term "oxygenation" is sometimes used to describe the same process.

Ozone is an allotropic form of oxygen, produced by the union of three atoms of oxygen in one molecule, while the oxygen molecule is composed of but two atoms. It is a colorless gas, having a peculiar unpleasant odor, and rapidly changing to normal oxygen. It is a wonderful bleaching and deodorizing agent. It is produced by the action of electricity on oxygen, and by other methods, and was formerly called "electrified air."

Oxygen and its compounds are further described in the Chemical Section, Part I.

OXYMEL. Br.

The Br. P. formula is:

Clarified Honey,	40 ounces	or	800 Gm.
Acetic Acid,	5 fl.ounces	or	100 Cc.
Distilled Water,	5 fl.ounces	or	100 Cc.

"Mix the clarified honey with the acetic acid and about 5 fl.ounces (or 100 Cc.) of distilled water, or sufficient to produce Oxy-mel having the specific gravity 1.320." <Br.

The dose is 1 to 2 fl.drachms for coughs etc.

OXYMEL SCILLÆ. Br. Oxy-mel of Squill.

Squill, bruised,	2½ ounces	or	75 Gm.
Acetic Acid,	2½ fl.ounces	or	75 Cc.
Distilled Water,	8 fl.ounces	or	240 Cc.
Clarified Honey, liquified, a sufficient quantity.			

"Digest the squill for 7 days in a mixture of the acetic acid and distilled water. Press strongly; filter. Mix the product, which should measure approximately 10 fl.ounces (or 300 Cc.), with about 27 fl.ounces (or 810 Cc.) of the clarified honey, or sufficient to produce Oxy-mel of Squill having the specific gravity 1.320." <Br.

Dose, ½ to 1 fl.drachm.

This was formerly made with vinegar of squill 5 parts, clarified honey 8 parts, both by weight.

PANCREATINUM. U. S. Pancreatin.

The U. S. P. describes pancreatin as "A mixture of the enzymes naturally existing in the pancreas of warm-blooded animals, usually obtained from the fresh pancreas of the hog (*Sus scrofa*) Linné, or the ox (*Bos taurus*) Linné, and consisting principally of amylopsin, myopsin, trypsin and steapsin, and proved to be capable, when assayed by the process given, of converting not less than 25 times its own weight of starch into substances soluble in water." <U. S.

Pancreatin is a ferment, the agent by which fats are converted into emulsions before entering the circulation. It is obtained for medicinal use from the pancreas of the hog, or other domestic animals, by chopping them fine, macerating with successive small portions of water, pressing, straining the liquids, then filtering through flannel, adding to the filtrate an equal bulk of alcohol, and after standing gathering the precipitate, pressing it between bibulous paper and drying. The product is a transparent, brittle, yellow mass, which might properly be called Crystal Pancreatin. This is supplied as it is, or in powder, and is used in pharmacy in making emulsions and elixirs, and in medicine to aid in the assimilation of fats.

Pancreatin is given in the form of powder, and in solution in elixirs etc., and is used in making emulsions of cod liver oil. It is also employed for peptonizing milk; 5 grains of the powder, 30 grains sodium bicarbonate, dissolved in 4 ounces of warm water, added to a pint of milk and heated to 38°C. (100.4°F.) for 30 minutes.

Average dose.—0.500 Gm.=500 milligrammes (7½ grains).

Pancreatinum Saccharatum. Saccharated Pancreatin. This may be prepared by mixing 1 part of the pancreatin in powder with 9 parts of powdered milk sugar. The dose is from 20 to 60 grains.

PAPAIN. Papagostin. Papoid.

A digestive ferment is prepared from the juice of the ripe fruit of *Carica papaya*, a tropical pawpaw. It is an amorphous, whitish powder, liable to change when exposed to the air. It is used externally for the removal of false membranes of croup or diphtheria, and for epithelioma, cancer, warts etc. It is given internally as an aid to digestion in doses of $1\frac{1}{2}$ to 3 grains, in the form of wine or syrup, also in tablets and pills.

PAPINE.

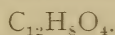
A proprietary anodyne prepared from opium by Battle & Co., of St. Louis, claimed to represent the anodyne power of $\frac{1}{8}$ grain of morphine in a fl.drachm. A similar preparation may be made with

Deodorized Tincture of Opium,	2½ fl.ounces
Elixir,	13½ fl.ounces

Mix them. Dose, 1 teaspoonful.

This preparation must not be mistaken for the foregoing powder.

PARACOTOIN.



A yellowish, crystalline powder, prepared from coto or paracote bark from Bolivia. It is used for catarrhal, tuberculous and typhoid diarrhoeas, and for sweating of phthisis. Dose, 2 to 3 grains.

PARAFFINUM. U. S. Paraffin.

"A mixture of solid hydrocarbons, chiefly of the methane series; usually obtained by chilling and pressing the distillates from petroleum having high boiling points, and purifying the solid press-cake so obtained." <U. S.

This is commonly known in the U. S. as Paraffin or Paraffin Wax. Its sp. gr. is from 0.890 to 0.905 at 25°C. (77°F.). It is insoluble in water or alcohol, but readily soluble in ether, petroleum benzin, benzene, carbon disulphide and oils when warm.

It melts at from 51.6° to 57.2°C. (125° to 135°F.).

After distilling the lighter hydrocarbons, as naphtha and illuminating oils, from petroleum, the distillation is continued until only coke remains as a residue. A portion of this latter distillate consists of paraffin oils which hold paraffin in solution while hot, but when chilled by ice or other means of refrigeration the paraffin is separated and may be collected and pressed in strong linen bags to remove the oil and afterwards purified, melted and run into cakes.

As prepared for the market it is of several degrees of hardness and melting points, and is used in the arts and pharmacy for various purposes. It is extensively used by bottlers for paraffining corks and for sealing corks which sink just a little below the rim of the neck of the bottle, and for covering jellies and preserved fruits, and for making waxed paper. In pharmacy it is often used instead of beeswax for making cerates and ointments.

Paraffinum Durum. Br. **Hard Paraffin.** "A mixture of several of the harder members of the paraffin series of hydrocarbons; usually obtained by distillation from shale, separation of the liquid oils by refrigeration, and purification of the solid product." <Br.

Sp. gr. 0.82 to 0.94. Melts at 130° to 135°F. (54.4° to 57.2°C.). Insoluble in water or alcohol.

Although this is obtained from a different source, it is, for all purposes, the same as the paraffin of the U. S. P.

Paraffinum Liquidum. Br. **Liquid Paraffin.** "A clear oily liquid obtained from petroleum after the more volatile portions have been removed by distillation." <Br.

Sp. gr. 0.885 to 0.890. Insoluble in water or alcohol; soluble in ether, chloroform and petroleum benzin.

Paraffinum Molle. Br. **Soft Paraffin.** "A semi-solid mixture containing soft members of the paraffin series of hydrocarbons; usually obtained by purifying the less volatile portions of petroleum." <Br.

Sp. gr. at melting point 0.840 to 0.870. Melts at 96° to 102°F.

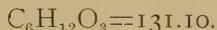
This is the same, for all purposes, as Petrolatum of the U. S. P.

Its melting point is lower than the U. S., corresponding more nearly to what is known as "Vaseline," or "Petroleum Jelly."

PARAFORMALDEHYDE. Paraform.

This is chemically, trioxymethylene, a white powder insoluble in alcohol or ether; but giving off, when heated, vapor of formaldehyde. It is extensively used for disinfecting articles and rooms which have been exposed to infection. The cabinet or room containing the infected articles is tightly closed and heat applied to the paraform, which liberates formaldehyde gas.

PARALDEHYDUM. U. S., Br. Paraldehyde.



"A polymer of acetaldehyde [$\text{CH}_3\cdot\text{COOH}=43.70$]. Paraldehyde should be kept in well-stoppered, dark amber-colored bottles in a cool place." <U. S.

"Paraldehyde, $\text{C}_6\text{H}_{12}\text{O}_3$, is a product of the polymerization of aldehyde by various acids and salts." <Br.

Soluble in 8 parts of water at 25°C. (77°F.), and in 16.5 parts of boiling water; miscible in all proportions with alcohol, ether and oils.

At about 0°C. (32°F.) it solidifies to a crystalline mass which becomes liquid again at 10.5°C. (51°F.). It boils at 123° to 125°C. (253.4°F.). Sp. gr. 0.990 at 25°C. (77°F.).

Paraldehyde has been considerably used as a hypnotic, and is also useful as a diuretic.

Average dose.—2 Cc. (30 minims).

Metaldehyde. This, like paraldehyde is a polymer of aldehyde, but as it is rather uncertain it is not so generally used. It is in colorless, acicular crystals, insoluble in water and but little soluble in alcohol and ether. Its action is hypnotic, similar to paraldehyde. Dose, 1 Gm. (15 minims).

Pure Food and Drugs Law. Paraldehyde and its compounds, being derivatives of alcohol, are subject to the Pure Food and Drugs Law.

PELLETIERINA. Pelletierine.

An alkaloid obtained from *Punica Granatum*, Pomengranate Bark. Salts of this alkaloid are prepared and are reputed to be very effective for the removal of tape-worm.

The sulphate or the tannate of this alkaloid are usually employed for this purpose.

Pelletierinæ Sulphas. Pelletierine Sulphate. This may be prepared by saturating diluted sulphuric acid with pelletierine alkaloid, concentrating the solution by evaporation and crystallizing. This is official in the Fr. Ph. Dose, 4 grains.

PELLETIERINÆ TANNAS. U. S. Pelletierine Tannate.

"A mixture of varying proportions of the tannates of the four alkaloids (punicine, iso-punicine, methyl-punicine, and pseudo-punicine), obtained from *Punica Granatum*, Linné (Fam. Punicaceæ). It should be kept in small, well-stoppered, dark amber-colored vials." <U. S.

This is the combination of pelletierine generally used as a remedy for tape-worm. It is a light yellow, odorless, amorphous powder, having an astringent taste, and a weak acid reaction.

Soluble in 225 parts of water, 12.6 parts of alcohol and in 300 parts of ether at 25°C. (77°F.).

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

PEPSINUM. U. S., Br. Pepsin.

"A proteolytic ferment or enzyme obtained from the glandular layer of the fresh stomachs of the hog (*Sus scrofa*, var. *domesticus*, Gray), and proved to be capable, when assayed by the process given, of digesting not less than 3000 times its own weight of freshly coagulated and disintegrated egg albumen." <U. S.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

"An enzyme obtained from the mucous lining of the fresh and healthy stomach of the pig, sheep or calf. Tested as described in the Br. P. it should dissolve 2500 times its weight of hard-boiled white of eggs." <Br. Dose, 5 to 10 grains.

Pepsin is a ferment, an agent by which a portion of the food which is taken into the stomach is dissolved and fitted for assimilation. It is obtained from the mucous membrane of the stomachs of various animals, that from the stomach of the hog being preferred for most purposes. Prof. Scheffer's method is now quite generally employed. It is as follows: The fresh stomachs are deprived of their fat and divested of their outer coating, cut open, gently washed with cold water, and macerated for several days, with frequent stirring, in a "pickle" composed of water 30 parts, and hydrochloric acid 1 part. The liquid is then strained and filtered through coarse paper, or allowed to stand 24 hours, and then poured off. Common salt is then added and thoroughly mixed with the liquid. The pepsin rises to the top, and after standing is skimmed off and drained in a strainer, then subjected to strong pressure to force out all that is possible of the saline solution, and carefully dried in warm air without heat. This constitutes the crude pepsin which is used for making purified pepsin, saccharated pepsin etc.

Purified Pepsin or **Scale Pepsin**. This is prepared by redissolving the crude pepsin, before drying, in water acidulated with hydrochloric acid, then adding just sufficient salt to separate it from its solution, washing it gently with cold water and draining, pressing, and drying rapidly on glass with gentle heat.

Crystal Pepsin. A pepsin bearing this brand is prepared by Dr. Carl L. Jensen, of Philadelphia. The process by which it is prepared is said to be by subjecting the stomachs to the action of heat and dilute acid, whereby a gastric digestion takes place and a peptone containing their digestive ferments is produced. It is then purified and dried in the manner above described.

Many rival manufacturers of pepsin under different names urge the superiority of their product, but the process as given is believed, if properly conducted, to produce the most reliable of any.

PEPSINUM SACCHARATUM. Saccharated Pepsin.

This was formerly official in the U. S. P. but has been dismissed. It may be prepared as follows:

Pepsin,	10 Gm. or 1 ounce
Sugar of Milk, in powder,	90 Gm. or 9 ounces

Triturate the pepsin with sugar of milk to a fine uniform powder.

The value of this preparation must, of course, depend upon the scale or crude pepsin that is employed. One part of the finished product dissolved in 500 parts of water and acidulated with 7.5 parts of hydro-

chloric acid should digest at least 300 parts of hard-boiled egg albumen, in 5 or 6 hours, at a temperature of 38° to 40°C. (100° to 104°F.). Unless saccharated pepsin will stand this test it should not be used. Dose, 1 to 2 Gm. (15 to 30 grains).

PEPSIN COMPOUND. Compound Powder of Pepsin.

Scale or Purified Pepsin,	10 parts
Pancreatin, pure,	10 parts
Lactic Acid,	1 part
Diastase, (Vegetable Ptyalin),	1 part
Hydrochloric Acid,	3 parts
Sugar of Milk,	75 parts

Powder the pepsin and pancreatin by rubbing with the sugar of milk, add the diastase and, when they are all reduced to a fine powder and intimately mixed, add the acids first to a small portion by rubbing them well together and then add the remainder and mix.

If saccharated pancreatin and pepsin are used, 47½ parts of each should be used and sugar of milk omitted.

Under the name "Lactopeptine," a preparation put up by the New York Pharmacal Association has had an extensive sale. Its composition is similar to the foregoing. (See also Pulvis Pepsini Compositus).

PEPTONES.

Peptones are formed by the action of pepsin or pancreatin etc., on lean beef or albuminous substances. They are, in fact, partially digested foods, fitted for assimilation. Manufacturers have introduced preparations containing peptones, to aid disordered peptic digestion etc. They are usually made by chopping lean beef very fine and macerating it for about 6 hours in a solution of pepsin with water and hydrochloric acid, at a temperature of about 104°F. The beef is thus mostly dissolved, the mixture strained, and the solution may be combined with various medicines as may be required. Excess of pepsin and pancreatin are sometimes added to wines, elixirs, emulsions etc. The liquid peptone is also evaporated and furnished in the form of scale salt, as beef peptone, or any meat peptone—one part representing ten parts of lean beef. Combinations of peptone with iron and manganese, and various medicinal substances are considerably used in medicine. They are usually in liquid form, as elixirs, wines etc.

PETROLATUM. U. S. Petrolatum.

Cosmoline. Vaseline. Petroleum Ointment, Etc.

"A mixture of hydrocarbons, chiefly of the methane series, obtained by distilling off the lighter and more volatile portions from petroleum, and purifying the residue." <U. S.

Petrolatum is the commercial name by which this substance is generally known. Its melting point is from 104° to 125°F . This substance is mostly prepared from the residuum which collects in storage tanks, oil wells etc., which is familiarly known as "B. S. oil." From this the lighter portions are distilled and the residue transferred to large percolators or cylinders, partly filled with freshly prepared animal charcoal (bone black) and kept heated by proper appliances to a proper degree which will liquify the oil. As it comes through the percolator it is deodorized and decolorized, the first portions being white when cold and the latter runs being from a light amber to a dark color. It is then brought up to the proper melting point, which is usually 45° to 48°C . (113° to 118.4°F .), by adding paraffin and mixing them thoroughly.

Uses. The value of this product as an ointment base caused it to be almost universally adopted for that purpose in advance of official recognition. It does not become rancid with age. It is claimed that it is not so readily absorbed as lard, and that some desired chemical changes in some of the ointments do not take place when this is used. These objections are noted under the proper formulas.

PETROLATUM ALBUM. U. S. White Petrolatum.

"A colorless mixture of hydrocarbons, chiefly of the methane series, obtained by distilling off the lighter and more volatile portions from petroleum, and purifying the residue." <U. S.

This is simply petrolatum corresponding with the foregoing, except that it is more thoroughly deodorized and decolorized by filtering through a larger quantity of animal charcoal.

PETROLATUM LIQUIDUM. U. S. Liquid Petrolatum.

Paraffinum Liquidum. Br. Liquid Paraffin.

"A mixture of hydrocarbons, chiefly of the methane series, obtained by distilling off the lighter and more volatile portions from petroleum, and purifying the residue." <U. S.

"A clear oily liquid obtained from petroleum after the more volatile portions have been removed by distillation." <U. S.

This is known commercially as white paraffin oil or mineral glycerin, and is put up under various proprietary names, as Albolene, Glymol, Glycoleum etc. It is much used in oil sprayers, nebulizers etc.

It is a colorless oil without taste or odor, making a good base for oil liniment. Its sp. gr. is about 0.875 at N. T. It is insoluble in alcohol or water, but readily soluble in ether, oil of turpentine, benzin, benzol, and oils generally.

PETROLEUM.

This important hydrocarbon, which is obtained from the earth by drilling "oil wells," is the source of many valuable substances em-

ployed in pharmacy and medicine. As obtained from the earth it is called "crude oil," or "crude petroleum." By fractional distillation several light ethereal products are first obtained, then the illuminating oils, and after these the heavier products, among which are petrolatum and paraffin. Crude petroleum is considerably used in liniments for rheumatism, swellings etc.

Petroleum is a natural mixture of hydrocarbons belonging to several of the homologous series classified in organic chemistry as the paraffin series, C_nH_{2n+2} , beginning at methane, and including in several members of the series, the greater part of the liquid portion of the oil; the olefin series, C_nH_{2n} , and also the benzin series, C_nH_{2n-6} .

The lighter products of fractional distillation of petroleum are:

Cymogene. Sp. gr. 0.590, which boils at $32^{\circ}F.$, the freezing point of water, and is only obtained by condensing the vapors which first pass over, by a specially constructed pump. It has no practical use.

Rhigolene. Sp. gr. 0.625, boils at $65^{\circ}F.$, and is condensed by ice and salt from the first vapors that come over. It is used for freezing mixtures, and as a spray for local freezing in surgical operations. It must be handled with great caution.

Gasoline, Petroleum Ether or Benzin. Sp. gr. 0.665 to 0.675. Condensed in a worm by cold water. It is extensively used for vaporizing in gas machines for burning in properly constructed stoves, as a source of power in internal combustion engines, also for removing grease and as a solvent for fixed oils. This is the official benzin. (See Benzin).

Naphtha. Sp. gr. 0.695 to 0.705. This is a heavier form of gasoline, used for burning and as a solvent for oils etc. (See Benzin).

Benzine. Sp. gr. 0.725 to 0.737. This was formerly extensively used as a substitute for turpentine, but is now but little employed except as a solvent for gums in making some kinds of varnish and rubber cements. It is mostly worked in with the illuminating oils.

Carbon Oil or Refined Petroleum. Sp. gr. 0.800 to 0.815. This is the illuminating oil which varies considerably in sp. gr. etc., as made for different purposes and by different firms. The standard test at which carbon oil will flash or explode when heated is regulated by legislation in different States from $100^{\circ}F.$ to $150^{\circ}F.$ The New York state test being $138^{\circ}F.$ Signal oil, which is burned in lanterns and headlights is a still higher test oil, usually mixed with sperm oil. After the illuminating oils are obtained, lubricating oils are separated, then the heavier products, petrolatum, paraffin, tar, coke and other derivatives which correspond to the products obtained from coal-tar.

The flashing point test of illuminating oil varies in different States from 110° to $150^{\circ}F.$

PHENACETINUM. Br. Phenacetin.

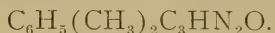
"Para-acet-phenetidin or Phenacetin is produced by the interaction of glacial acetic acid and para-phenetidin, a body obtained from para-nitro-phenol." <Br.

Phenol is first converted into nitro-phenol by treating with an equivalent quantity of nitric acid. The para-nitro-phenol of the compound is separated by distilling off the ortho-nitro-phenol by steam, leaving it as a residue. Sodium carbonate is added to this and it is treated with ethyl iodide, producing para-nitro-phenol. This is reduced with sodium amalgam to paraphenetidin, $\text{C}_6\text{H}_4(\text{NH})\text{OC}_2\text{H}_5$, which is the base of phenacetidin. This is then acted upon by glacial acetic acid and para-acetamidophenol, or phenacetin is produced.

This has been one of the most popular antipyretics, and has been the cause of much contest in this country owing to the fact that a certain firm obtained rights from the German manufacturers for its exclusive sale in this country, and they obtained trade-mark protection for it here and sold it at an extravagant price. Other foreign manufacturers made it and it has been extensively smuggled through Canada and Mexico and sold to retail druggists here at about half the price of the trade-mark preparation.

Uses. It is used as an antipyretic and for neuralgia, hysteria, epilepsy and spasmodic cough, especially whooping cough and the cough following la grippe. Dose, 5 to 10 grains.

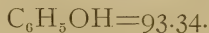
Many combinations of phenacetin with other substances are known and used in medicine.

PHENAZONUM. Br. Phenazone. Antipyrene.

"A crystalline substance obtained from phenyl-hydrazine." <Br.

This is fully described under the heading Antipyrinum, which see.

Phenolid. A preparation sold by this name as a competitor of anti-rheumatine is said to be made by mixing intimately acetanilid 5 drachms, with sodium salicylate 4 drachms. Dose, 10 to 15 grains.

PHENOL. U. S. Phenol. [Carbolic Acid].

"Hydroxbenzene, obtained either from coal-tar by fractional distillation and subsequent purification, or made synthetically. It should contain, when assayed by the process given, not less than 96 percent. of absolute Phenol. It should be kept in dark amber-colored, well-stoppered bottles." <U. S.

This is known commercially as carbolic acid and in the U. S. and Great Britain is generally called for and dispensed under that name.

In most of the European pharmacopœias it is known as Phenol or by some similar title. See Acidum Carbolicum.

It is soluble in 19.6 parts of water at 25°C. (77°F.), the solubility varying somewhat, according to the degree of hydration of the phenol. It is very soluble in alcohol, ether, chloroform, benzene, glycerin and the oils; but almost insoluble in petroleum benzin.

Average dose.—0.065 Gm.=65 milligrammes (1 grain).

Phenolphthalein is prepared from phenol and phthalic anhydride. It is used as a test solution. It is also used in medicine under the name **Purgen**, as a purgative. It is also known by several other names indicating its laxative qualities.

Phenopyrin. A liquid prepared from equal parts, by weight, of carbolic acid (crystals) and antipyrin.

Phenosalyl. A clear liquid used as an antiseptic in surgery in solution 1 to 2 percent., also in ointment 1 percent., and for medicating gauze. It is a mixture of carbolic, salicylic, benzoic and lactic acids; glycerin is sometimes used as a solvent.

PHENOL LIQUEFACTUM. U. S. Liquefied Phenol.

"A liquid composed of not less than 86.4 percent., by weight, of absolute Phenol [$C_6H_5OH=93.34$], and about 13.6 percent., by weight, of water." <U. S.

Phenol, a convenient quantity,

Distilled Water, a sufficient quantity.

"Liquify the phenol by placing the unstoppered container in a water-bath, and apply heat gradually until the crystals have melted; transfer the liquid to a tared vessel and weigh; then add for each nine grammes of phenol one gramme of distilled water and mix thoroughly. It should be kept in dark, amber-colored, well-stoppered bottles." <U. S.

This is generally known in the U. S. and Great Britain as Liquefied Carbolic Acid.

It is more fully described under the title Acidum Carbolicum Liquefactum, which see. Its sp. gr. is about 1.065 at 25°C. (77°F.). It is soluble in 12 parts of water at 25°C. (77°F.), miscible with alcohol ether and glycerin in all proportions.

Average dose.—0.05 Cc. (1 minim).

The same remarks as apply to the title of Phenol apply also to the Liquefied Phenol. Its uses are generally the same, but in some chemical combinations the water is undesirable.

PHENETIDIN.

This is the basis of a number of chemical compounds, of which phenacetin is best known. The process of making it before it is combined with acetic acid is the preparation which is described under

Phenacetin. The following compounds of Phenetidin are known and are somewhat used in medicine:

Phenetidin Amygdalate or **Mandelate**. This is better known by its trade name **Amygdophenin**. It is a grayish-white powder readily soluble in alcohol, but little soluble in water. An analgesic and anti-rheumatic. Dose 15 grains.

Phenetidin Amido-aceto-hydrochloride. This is an antipyretic compound in white crystals, soluble in 16 parts of water. Dose 5 to 15 grains.

Phenetidin Citrate. Commonly known as **Citrophen**. A combination of phenetidin with citric acid. Soluble in 40 parts of water. Uses the same as phenacetin. Dose 5 to 15 grains.

Phenetidin Quinine-carbonic-ester. Commonly known as **China-phenine**. A combination of phenetidin with quinine. Uses and doses the same as the quinine salts, in fevers, malaria etc.

Phenetidin Tartrate. A tartrate combination of phenetidin known as **Vinopyrine** or **Tartrophen**. A white crystalline powder soluble in 25 parts of water. Antipyretic and analgesic. Dose 12 to 15 grains.

Phenocoll Hydrochloride. This is designed as a soluble antipyretic like antipyrine. It is prepared by the interaction of phenetidine and glycoll. It is given in doses of 8 grains, dissolved in hot sweetened water, or as a powder on the tongue, followed by a drink of water. The acetate, carbonate and salicylate of phenocoll are used.

PHENYL.



Phenyl is the hypothetical radical of the phenyl series of compounds, of which phenol and phenylamine are derivations.

Phenol or **Carbolic Acid**. $\text{C}_6\text{H}_5\text{HO}$. A product of the distillation of coal-tar between the temperatures of 180° and 190°C . (356° and 374°F .).

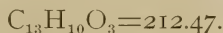
Carbolic acid, or phenol, is the hydrate of phenyl, or phenylic alcohol. Crude carbolic acid is a liquid distilled from coal-tar, containing many empyreumatic products. Pure crystallized carbolic acid is made by distilling crude carbolic acid and purifying the crystallized product obtained by repeated distillations. See Phenol.

Cresylic Acid or **Cresol**. $\text{C}_7\text{H}_8\text{O}$. This is a homologue of carbolic acid, very similar to it but less soluble.

Phenylamine or **Aniline**. $\text{C}_6\text{H}_5\text{H}_2\text{N}$. This is the base of the aniline salts so extensively used for dyeing. (See Aniline). It is prepared by treating an alcoholic solution of nitrobenzol with ammonia and hydrogen sulphide until sulphur is precipitated. The liquid portion is again treated with hydrogen sulphide until no more sulphur can be precipitated. The liquid is then mixed with an excess of acid, filtered, boiled and distilled with an excess of caustic potassa.

Phenyl-Hydrazin Hydrochloride. This is a chemical compound recommended as a reliable test for glucose in urine. It is soluble in alcohol.

PHENYLIS SALICYLAS. U. S. Phenyl Salicylate. [Salol].



"The salicylic ester [$\text{C}_6\text{H}_4(\text{OH})\text{COOC}_6\text{H}_5$ 1:2] of phenyl." < U. S.

This compound commonly known as Salol, is considerably used as a remedy for rheumatism.

It is a white, crystalline powder, prepared by the interaction of phenol and salicylic acid in presence of a chloride of phosphorus, and by the aid of heat.

It is soluble in 2333 parts of water and in 5 parts of alcohol at 25°C. (77°F.). Used as medicine it passes unchanged into the small intestines, when it is broken up by the action of the pancreatic juice liberating salicylic acid and phenol.

Average dose.—0.500 Gm.=500 milligrammes (7½ grains).

PHOSPHORUS. U. S., Br. Phosphorus.

Symbol P; Atomic weight 30.77; Sp. gr. 1.830 at 10°C. (50°F.).

Phosphorus is a non-metallic element existing in nature mainly in the form of salts, and obtained for use by decomposing its compounds. It is mostly prepared from acid calcium phosphate by heating with charcoal and collecting the distillate under warm water, afterwards filtering by squeezing through chamois leather under warm water, then moulding it in sticks, in which form it comes into the market.

Phosphorus assumes several allotropic forms under different treatment. In its normal condition, as above described, it is the ordinary phosphorus of the market; pale-yellow, semi-transparent; soft and waxy when warmed to about 75°F., melting at 111°F., taking fire in the air at 165°F., and slowly oxidizing in the air at all temperatures above 60°F. It must be preserved under water. It is more fully described in the Chemical Section, Part I.

Uses. Phosphorus is extensively used in making matches, and in the form of pills and solutions is considerably employed in medicine as a nerve tonic and vitalizer. Its acids and salts are important pharmaceuticals extensively used both in medicine and pharmacy and in the industrial arts.

Average dose.—0.0005 Gm.=0.5 milligramme ($\frac{1}{128}$ grain).

Allotropic Forms of Phosphorus.

Phosphorus assumes under different treatment several allotropic forms, which, although different in physical characteristics, are the same chemically.

Red or Amorphous Phosphorus is prepared by exposing ordinary phosphorus to an atmosphere of carbonic acid gas at 225° to 250°C.

for several days, when it is converted into a red, amorphous mass, having entirely different properties than ordinary phosphorus, being non-luminous, non-combustible at ordinary temperatures, and non-poisonous. When heated to 280°C . it is converted into ordinary phosphorus.

White Phosphorus, Black Phosphorus and Liquid Phosphorus are other allotropic forms obtained by various treatments, but not used in pharmacy.

Combinations of Phosphorus.

Phosphorus combines with metallic bases, forming phosphides, the more important ones being noticed under the metal with which it combines. It also unites with not-metals, forming compounds, the more important of which are here noticed.

Chloride of Phosphorus. PCl_5 . By the spontaneous combustion of phosphorus in an excess of dry chlorine, or by passing dry chlorine into liquid terchloride of phosphorus; an oxychloride of phosphorus, PCl_3O , is made by heating chloride of phosphorus with a quantity of water insufficient to convert it into phosphoric acid.

Hydride of Phosphorus. PH_3 , or Phosphoretted Hydrogen, is an explosive gas made by boiling phosphorus with milk of lime, as in making hypophosphorous acid. It has a very disagreeable odor.

Oxides of Phosphorus. With oxygen phosphorus forms three oxides, phosphoric oxide, P_2O_5 ; phosphorus dioxide, P_2O_3 ; and hypophosphorous oxide, P_2O .

Acids of Phosphorus. The more important of these acids already have been described under the heading Acids, which see.

Orthophosphoric Acid, H_3PO_4 (tribasic), is made by dissolving phosphoric oxide in water, or by the action of nitric acid on phosphorus. The 85 percent. solution is the U. S. official phosphoric acid. The salts made by combining this acid with bases are called **Phosphates**.

Pyrophosphoric Acid, $\text{H}_4\text{P}_2\text{O}_7$, by heating orthophosphoric acid to 213°C . (415.4°F .).

Metaphosphoric Acid, by igniting tribasic phosphoric acid, or by dissolving P_2O_5 in cold water. These three acids correspond to the oxides above mentioned.

Phosphorous Acid, H_3PO_3 , cannot be formed directly from phosphorous oxide, but is a dibasic acid, containing one hydrogen atom that cannot be replaced by a metal. The salts of this acid are called **Phosphites**.

Hypophosphorous Acid, H_3PO_2 , cannot be made directly from hypophosphorous oxide. It contains two hydrogen atoms not replaceable by a metal. It is the acid base of the hypophosphite salts.

PHYSOSTIGMA. U. S. Physostigma.**Physostigmatis Semina. Br. Calabar Bean.**

"The ripe seed of *Physostigma Venenosum*, Balfour (Fam. Leguminosæ), yielding, when assayed by the process given, not less than 0.15 percent. of alkaloids soluble in ether." <U. S.

The assay process is given in full in the U. S. P. Retail druggists seldom assay this drug but depend upon reliable dealers for their supply, and their label should state that it conforms to the U. S. P. requirements.

An extract and a tincture of physostigma are official in the U. S. P. The powdered beans are also administered.

Average dose.—0.100 Gm.=100 milligrammes ($1\frac{1}{2}$ grains).

This is more fully described in the Organic Materia Medica Section, Part I.

PHYSOSTIGMINA. Physostigmine. [Eserine].

The active principle of calabar bean (physostigma) is obtained by exhausting finely powdered calabar bean with alcohol by means of a water-bath percolator, distilling off most of the alcohol of the percolate, adding water to the residue and shaking with ether, which dissolves the alkaloid. The ether is allowed to evaporate and the alkaloid is obtained in crystals.

Uses. Physostigmine, which is more frequently called Eserine, is a powerful sedative poison, the dose being $\frac{1}{200}$ to $\frac{1}{60}$ grain.

PHYSOSTIGMINÆ SALICYLAS. U. S.**Physostigmine Salicylate. [Eserine Salicylate].**

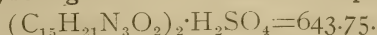
"The Salicylate [$\text{C}_6\text{H}_4(\text{OH})\text{COOH} \cdot \text{C}_{15}\text{H}_{21}\text{N}_3\text{O}_2$] of an alkaloid obtained from Physostigmina. It should be kept in small, dark amber-colored, well-stoppered vials." <U. S.

It is soluble in 72.5 parts of water, 12.7 parts of alcohol, 175 parts of ether and 8.6 parts of chloroform at 25°C . (77°F).

This official salt may be prepared by adding 2 parts of physostigmine to a solution of 1 part of salicylic acid in 35 parts of boiling water, and allowing to crystallize on cooling.

Uses. This salt is used in solution to contract the pupil of the eye, and internally as a sedative in doses of from $\frac{1}{120}$ to $\frac{1}{20}$ grain.

Average dose.—0.001 Gm.=1 milligramme ($\frac{1}{64}$ grain).

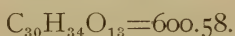
PHYSOSTIGMINÆ SULPHAS. U. S., Br.**Physostigmine or Eserine Sulphate.**

"The sulphate [$\text{SO}_2(\text{OH})_2 \cdot (\text{C}_{15}\text{H}_{21}\text{N}_3\text{O}_2)_2$] of an alkaloid obtained from Physostigma. It should be kept in small, dark amber-colored, well-stoppered vials." <U. S.

This may be produced by neutralizing diluted sulphuric acid with physostigmine (alkaloid), concentrating and crystallizing. As this is the most soluble salt of physostigmine it is preferred for hypodermic solutions.

Average dose.—0.001 Gm.=1 milligramme ($\frac{1}{64}$ grain).

PICROTOXINUM. Br. Picrotoxin.



A neutral principle obtained from the fruits of *Anamirta paniculata*—the kernel of *Cocculus Indicus*—by exhausting with hot water, evaporating to an extract, mixing the extract with magnesia, then treating with hot alcohol, filtering through animal charcoal, concentrating by evaporation and crystallizing.

Uses. This is used as an antispasmodic and nerve tonic, like strychnine, in doses of $\frac{1}{100}$ to $\frac{1}{25}$ grain.

PILOCARPINA. Pilocarpine.

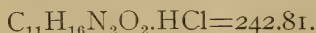


This is the chief medicinal constituent of the leaves of *Pilocarpus jaborandi*. It may be obtained by exhausting the drug with alcohol by the water-bath percolator, distilling off most of the alcohol from the percolate, adding water and soda or potassa alkali, collecting the precipitate, washing with chloroform and evaporating the solution. This produces pilocarpine, an uncrystallizable alkaloid.

Uses. Pilocarpine is a diaphoretic and sialogogue. Dose, $\frac{1}{16}$ to $\frac{1}{4}$ grain.

PILOCARPINÆ HYDROCHLORIDUM. U. S.

Pilocarpine Hydrochloride.



“The hydrochloride [$\text{HCl}\cdot\text{C}_{11}\text{H}_{16}\text{N}_2\text{O}_2$] of an alkaloid obtained from *Pilocarpus*. It should be kept in well-stoppered, amber-colored vials.”
<U. S.

This may be prepared by adding the alkaloid pilocarpine to dilute hydrochloric acid until it is neutralized or until no more will dissolve. The solution is then concentrated by evaporation and allowed to crystallize. Lastly, the crystals are drained and dried on bibulous paper.

Uses. This salt is used for the same purposes as the alkaloid, and its solution is often employed hypodermically. It is especially useful in treatment of the liquor habit.

Average dose.—0.010 Gm.=10 milligrammes ($\frac{1}{5}$ grain).

PILOCARPINÆ NITRAS. U. S. Br. Pilocarpine Nitrate.

"The nitrate $[NO_2OH \cdot C_{11}H_{16}N_2O_2]$ of an alkaloid obtained from Pilocarpus. It should be kept in well-stoppered, amber-colored vials." <U. S.

"The nitrate of an alkaloid obtained from jaborandi leaves." <Br.

This may be prepared by neutralizing diluted nitric acid with pilocarpine, evaporating the solution and crystallizing.

It is used for the same purposes as other pilocarpine salts, usually by hypodermic injection, the dose being $\frac{1}{20}$ to $\frac{1}{2}$ grain.

Average dose.—0.010 Gm.=10 milligrammes ($\frac{1}{5}$ grain).

It is soluble in 4 parts of water and in 60 parts of alcohol at 25°C. (77°F.). It contains no water of crystallization and, therefore, more nearly represents the alkaloid than some other salts that contain a considerable proportion of water.

PILOCARPUS. U. S. Jaborandi.**Jaborandi Folia. Br. Jaborandi Leaves.**

"The leaflets of Pilocarpus Jaborandi, Holmes; or of Pilocarpus microphyllus, Stapf (Fam. Rutaceæ), yielding, when assayed by the process given, not less than 0.5 percent. of alkaloids." <U. S.

"The dried leaflets of Pilocarpus Jaborandi, Holmes." <Br.

The plant from which these leaves are obtained is a species of rue grown in Brazil.

The preparations of this drug produce profuse perspiration and act upon other glands of the body as an active stimulant increasing the salivary secretion and the elimination of urea to a marked degree. It is, therefore, the best remedy known for uremia, and for other conditions in which it is desirable to cause glandular organs to discharge their secretions freely. It is used in influenza, catarrh, rheumatism, Bright's disease, synovitis etc. A fluidextract is official in the U. S. P.

The principal alkaloid is Pilocarpine.

Average dose.—2 Gm. (30 grains).

PILULÆ — PILLS.

Since the general introduction of sugar and gelatin-coated pills, their manufacture has been almost entirely monopolized by the manufacturing houses. The pill business has come to be a great nuisance to the druggist, for the reason that so many manufacturers urge their claims for superiority upon the physicians that a large stock of many different makes must be kept on hand in order to supply the demand.

It is not only unprofitable, but very annoying, to be obliged to keep so many manufacturers' pills on hand, but as yet there seems to be no way of avoiding it.

The pills that are included in the pharmacopœia constitute but a very small portion of those now in use, and as manufacturers' pills are nearly always coated with sugar or gelatine, it may be said that scarcely any pills made by the pharmacopœia formulas are dispensed by druggists.

The making and coating of pills to any great extent is impracticable for the mass of druggists, because it requires considerable apparatus and some experience and skill; and further, because there are so few of any but the leading or special pills used that it does not pay to make the small quantity required for the retail trade. Many druggists, however, may prefer to make some of their own pills as a matter of reliability or convenience. The general process therefore for making and coating pills, and such formulas as may seem expedient are given.

The recent introduction of reliable powdered extracts of American manufacture has very much simplified the making of pills, as the ingredients may be readily and accurately mixed before combining into a pill mass.

Many of the old solid extracts were very difficult to work evenly into a pill mass, and required much preparation before they were ready for use.

This is now happily done away with by the introduction of powdered extracts of all dangerous drugs, and by the use of which a thorough distribution of the medicinal agents may be secured.

Not only are the powdered extracts better on this account, but the mass can be much more readily prepared; as, with the old solid extracts it was often necessary to soften them, so that an extra amount of drier had afterwards to be used, which increased the bulk of the pill. Small pills are now the fashion in medicine, and a pill without some kind of coating is looked upon with great disgust by the great American stomach. Upon the nicety of the pill depends the nicety with which it can be coated, so the pill itself will first be considered, and afterwards its outer covering. This is the reverse of the view taken by the pill-taker, as he is usually more concerned as to the character of the covering than the character of the pill; but the pill-maker and the pill-taker can hardly be expected to take the same view of the subject.

The directions which follow are intended for the use of the ordinary druggists, with such conveniences as they all have, to make and coat pills in small quantities, suitable for the retail trade, and for extemporaneous and prescription business.

CONVENIENCES FOR PILL MAKING.

Pill machines are only adapted to making certain sizes of pills. For the manufacturer who is making a large quantity of certain sizes of pills they are a great assistance, but for the retail druggist but little use can be made of them. Those who have them can use them

for such sizes as their material will properly make, but it is hardly advisable for those who do not have them to buy them, as there are so few pills for which they can be used.

Materials vary so much that it is almost impossible for the druggist to so regulate the mass as to get the desired amount of material in each pill, when working with a machine. Take for instance calomel or quinine, a two-grain pill of one would be much smaller than a two-grain pill of the other, but the pill machine would make them both of the same size.

They are very convenient for marking and dividing the pill, and those who have them can use them for that purpose, but a simple, inexpensive pill marker is more servicable. The ordinary pill tile will answer every purpose. This with a pill roller, a pill rounder, and the ordinary mortars and pestles completes the necessary outfit for ordinary pill making, and experience does the rest.

The Excipients.

Many excipients have been proposed for making pills, with which druggists are already familiar, as mucilage, syrup, glucose, honey, soap, glycerin etc., and all of them have their uses, but nothing has been found so good for general purposes as the Starch Plasma, or, as we shall call it here, Excipient.

It is tenacious without being elastic, readily mixable, free from odor or objectionable taste, does not mould or spoil, keeps without change, keeps the pills soft and pliable, is inexpensive and readily made as follows:

Excipient.

Starch, in fine powder,

1 drachm

Glycerin, by weight,

1 ounce

Mix and heat, with constant stirring, to boiling (240°F.), or until it has assumed a uniform gelatinous mass. Too high a degree of heat must not be used, as it will burn the starch on the bottom, and it must be constantly stirred to prevent this result. It can best be made on a sand-bath.

In making pills with this excipient, use only a small quantity, well worked in with the pestle, and then, if more is required, it may be added.

The Driers.

The chief use of the drier is to dust the tile and roller and the pills after they are made, to prevent them sticking together.

It is sometimes necessary to use it with the mass when the extracts are too soft, or when oils or other liquids enter into the composition.

A great many substances are used for driers; as powdered licorice root, lycopodium, flour, starch etc., but the best drier to meet all the requirements for which it is needed is made thus:

Drier.

Starch, in very fine powder,

Elm Bark, in very fine powder,— equal parts, mixed.

This will be found much better than powdered licorice, lycopodium, or other substances usually used for this purpose.

Finely powdered starch or wheat flour alone is better for white pills than the above drier, as it does not color them. Dextrine also makes a good drier for colored pills.

They are best applied as a dusting with an ordinary sprinkler or pepper-box, such as are used on the dining table.

This completes the list of requisites for making pills, except, of course, the drugs that enter into their composition.

Making Pills.

The mass should always be made in a mortar proportionate to the amount required, and with a long-handled pestle, not too large. It is best to observe the following order in making the mass so as to secure the best results in the least time.

First.—Reduce all crystals or pulverizable masses to a very fine powder by rubbing in the mortar. Powerful drugs like strychnine, atropine, morphine etc., should be mixed with a small quantity of sugar of milk in powdering, so as to secure a thorough distribution of their particles. When the crystals or other drugs are thoroughly powdered, add any powdered extracts, resinoids or other powdered drugs that may be directed, and mix thoroughly and intimately in the mortar.

Second.—Add any solid extracts, confections or other masses that may be directed, taking great care to have them in such condition that they may be readily worked up with the other ingredients. Most extracts can be softened by warming a little; some require a little water or alcohol. Mix these thoroughly with the powders in the mortar by working them in with the pestle.

When this is done if it requires to be softened (which is generally the case), add enough of the excipient to make into a pilular mass, or if too soft, add enough of the drier to harden it.

In using the excipient, but a small amount is necessary, but it must be well worked in.

Never add alcohol, water or syrup to a pill mass if it can be avoided.

If any oils are directed in the formula, they should be mixed in the mortar with the excipient before it is added to the mass. They are thus emulsified and the oily particles broken up, so that a thorough distribution is effected. Do not add oils to the powders in the mortar, as a portion of the powder absorbs the oil and the distribution is much retarded. It is also much more difficult to work the mass than when the oils are first combined with the excipient.

If too much excipient has been used, drier may be added to bring it to the requisite temper, but it is better to be careful and not add too much, as the drier increases the bulk and size of the pill.

The Pill. Having now prepared the mass, the pill is next in order.

First.—Weigh the mass carefully and then (if for more than 24 pills) divide it into two portions that will make as many pills as the pill machine, tile, or divider indicates—12, 18 or 24 is the usual number. For instance, if 100 pills are to be made, and the whole mass weighs 316 grains, each pill will be 3.16 grains. If the pill tile, divider or machine is marked for 18 pills, $3.16 \times 18 = 56.88$, or 57 grains, which should be the weight of each portion, and you will have as many portions as 18 is contained in 100, or $5\frac{1}{2}$ portions.

Second.—Dust the tile or machine with the drier and roll each portion out to the length indicated for the number of pills. Several portions may be rolled out together at the same time, side by side, if the mass is of proper consistence, and drier is properly used. They should be rolled evenly from end to end, with a slanting motion of the roller.

When rolled to the proper length, divide as indicated by the tile, divider or machine, and roll into pills. Complete the rolling at last by rolling the rounded pills gently with a circular motion of the roller on the slab. Put in a shallow tin, or other convenient dish, in a cool place to harden.

A jelly-cake tin is very convenient for this purpose. A scale pan may also be used. The pills, thus prepared, are ready for coating.

Coating Pills.

Pills are coated chiefly to render them tasteless while being taken, but the coating serves the further important office of protecting them from the atmosphere.

Sugar Coating. The apparatus for coating pills advantageously with sugar is quite expensive, and the experience required to coat them artistically is considerable. They may, however, be coated in a small way by revolving the pills after they are made in a little albumen or mucilage to give them a thin coating, then transferring to another dish, dusting them well with finely powdered sugar, and rolling them in a shallow evaporating dish, thus giving them an even coating. This method is used only for extemporaneous work. To coat pills with sugar, as they are found in the market, requires a large copper globe, of which the upper third is cut off, and which is revolved at an angle (the same as are used by confectioners). The best apparatus of this sort is also arranged for an oscillating motion, which prevents the pills from adhering to the side. They are also arranged with heating apparatus, so that the heat may be maintained to any desired degree.

The pills are first partially dried, then coated over with tincture of tolu or a solution of shellac. Then put into the coating apparatus, add a little syrup of white sugar and a sprinkling of starch from time to time, while the globe is slowly revolved, a very moderate heat being applied at the same time, until the coating is of sufficient thickness. To give a finish or polish to the pills after they are coated, they are agitated in the coater with a few small lumps of paraffin or wax. It is obvious that small quantities of pills cannot be conveniently sugar-coated in this way.

It will thus be seen that sugar-coating pills, as they are found in the market, requires expensive machinery, experience and time, which are not at the disposal of the ordinary druggist in his business.

Gelatin Coating. Pills may be coated with gelatin by sticking them on pins and dipping them in a solution of gelatin etc., heated sufficient to keep it liquid, then revolving them in the air until the coating is sufficiently set so that the pills will not adhere when put together. The solution for gelatine or soluble coating may be made as follows:

Gelatin Coating.

Best White Gelatin, Cooper's, Cox's or French, 1 ounce av.

Water, 4 fl.ounces

Dissolve the gelatin in the water by the aid of a water-bath, and strain through a tin strainer or sieve into a water-bath, which must be kept warm, adding a trifle of warm water occasionally to make up for the evaporation. Dip the pills in the solution quickly, and revolve in the air until dry.

Gelacia, or Soluble Coating.

Gelatin, best white, 1 ounce av.

Gum Arabic, select, $\frac{1}{2}$ ounce av.

Glycerin, $\frac{1}{4}$ ounce av.

Water, $4\frac{1}{2}$ ounces av.

Dissolve the gum arabic in 2 ounce of water by allowing to stand over night, add this to the glycerin and the balance of water and gelatin and heat to dissolve the gelatin. When dissolved strain and keep warm with a water-bath while using.

The pills, stuck on pins or needles, are to be dipped into the solution and dried by revolving in the air,

This makes the best and smoothest coating for pills. It may with propriety be called gelatin coating. Apparatus of various kinds may be obtained for gelatin-coating pills, but without experience it proves generally unsatisfactory in the hands of druggists.

Silvering and Gilding Pills.

Pills are sometimes coated with silver or gold leaf. This is done simply by moistening the pills with a thin coating of albumen or

acacia solution and then revolving in a small globe in which leaves of silver or gold have been placed. The process is familiar to most druggists.

Besides the substances already mentioned for coating pills, French chalk or starch are sometimes used, the pills being first rolled in a solution of acacia, and then transferred to another dish containing the coating substance, which adheres sufficiently for the purpose. Paraffin or cacao butter are also used for coating pills. Paraffin coating is, perhaps, the best for small quantities of pills; the melted paraffin may be applied with a small brush to the pills rotated on a warm plate on in a shallow evaporating dish.

OFFICIAL PILLS.

The following are the pills official in the U. S. and Br. pharmacopœias:

In the U. S. and most other pharmacopœias the plural, *Pilulæ* or Pills of — is used as the title, and the number of pills which the formula is intended to make is specified, but in the Br. P. the title *Pilula*, or Pill of — in the singular, indicates a mass, the dose of which is specified.

PILULÆ ALOES. U. S. Pills of Aloes.

Purified Aloes, in fine powder, 13 Gm. or 200 grains

Soap, in fine powder, 13 Gm. or 200 grains

Water, a sufficient quantity to make 100 pills.

"Mix the powders intimately, then incorporate sufficient water to form a mass, and divide it into 100 pills." < U. S.

Average dose.—2 pills.

Pilula Aloes Barbadosis. Br. Pill of Barbados Aloes. Barbados aloes, in powder, 2 ounces (or 40 Gm.); hard soap, in powder, 1 ounce (or 20 Gm.); oil of caraway 1 fl.drachm (or 2.5 Cc.); confection of roses 1 ounce (or 20 Gm.), or a sufficient quantity. Mix to form a mass. Dose, 4 to 8 grains.

Pilula Aloes Socotrinæ. Br. Pill of Socotrine Aloes. Socotrine aloes, in powder, 2 ounces (or 40 Gm.); hard soap, in powder, 1 ounce (or 20 Gm.); oil of nutmeg 1 fl.drachm (or 2.5 Cc.); confection of roses 1 ounce (or 20 Gm.), or a sufficient quantity. Mix to form a mass. Dose, 4 to 8 grains.

PILULA ALOES ET ASAFETIDÆ. Br.

Pill of Aloes and Asafetida.

Socotrine Aloes, in powder, 1 ounce or 20 Gm.

Asafetida, in powder, 1 ounce or 20 Gm.

Hard Soap, in powder, 1 ounce or 20 Gm.

Confection of Roses, 1 ounce or 20 Gm.

or a sufficient quantity.

Mix to form a mass. Dose, 4 to 8 grains.

This was official in the U. S. P. 7th revision, but has been dismissed.

PILULÆ ALOES ET FERRI. U. S., Br.

Pills of Aloes and Iron.

Purified Aloes, in fine powder,	7 Gm. or 108 grains
Exsiccated Ferrous Sulphate,	7 Gm. or 108 grains
Aromatic Powder,	7 Gm. or 108 grains

Confection of Rose, a sufficient quantity to make 100 pills.

"Mix the powders intimately, then incorporate sufficient confection of rose to form a mass, and divide it into 100 pills." < U. S.

Pilula Aloes et Ferri. Br. "Exsiccated ferrous sulphate 1 ounce (or 20 Gm.), Barbados aloes, in fine powder, 2 ounces (or 40 Gm.), compound powder of cinnamon 3 ounces (or 60 Gm.), syrup of glucose 3 ounces (or 60 Gm.), or a sufficient quantity. Mix to form a mass. Dose, 4 to 8 grains." < Br.

PILULÆ ALOES ET MASTICHES. U. S.

Pills of Aloes and Mastic.

Purified Aloes, in fine powder,	13 Gm. or 200 grains
Mastic, in fine powder,	4 Gm. or 62 grains
Red Rose, in fine powder,	3 Gm. or 46 grains
Diluted Alcohol, a sufficient quantity to make 100 pills.	

"Mix the powders intimately, then incorporate sufficient diluted alcohol to form a mass and divide into 100 pills." < U. S.

Average dose.—2 pills.

This is popularly known as Lady Webster's Dinner Pill.

PILULÆ ALOES ET MYRRHÆ. U. S., Br.

Pills of Aloes and Myrrh.

Purified Aloes, in fine powder,	13 Gm. or 200 grains
Myrrh, in fine powder,	6 Gm. or 92 grains
Aromatic Powder,	4 Gm. or 62 grains

Syrup, a sufficient quantity to make 100 pills.

"Mix the powders intimately, then incorporate sufficient syrup to form a mass, and divide it into 100 pills." < U. S.

Average dose.—2 pills.

Pilula Aloes et Myrrhæ. Br. Socotrine aloes, in powder, 2 ounces (or 40 Gm.), myrrh, in powder, 1 ounce (or 30 Gm.), syrup of glucose 1½ ounces (or 30 Gm.). Mix to form a mass. Dose, 4 to 8 grains.

PILULÆ ASAFÆTIDÆ. U. S. Pills of Asafetida.

Asafetida,	20 Gm. or 308 grains
Soap, in fine powder,	6 Gm. or 93 grains
Water, sufficient to make 100 pills.	

"Beat the solids together with water so as to form a mass, and divide it into 100 pills." <U. S. Average dose, 2 pills.

PILULA CAMBOGIÆ COMPOSITA. Br.

Compound Pill of Gamboge.

Gamboge, in powder,	1 ounce or 25 Gm.
Barbados Aloes, in powder,	1 ounce or 25 Gm.
Compound Powder of Cinnamon,	1 ounce or 25 Gm.
Hard Soap, in powder,	2 ounces or 50 Gm.
Syrup of Glucose,	1 ounce or 25 Gm.
or a sufficient quantity to form a mass. Dose, 4 to 8 grains. <Br.	

PILULÆ CATHARTICÆ COMPOSITÆ. U. S.

Compound Cathartic Pills.

Compound Extract of Colocynth,	80 Gm. or 1235 grains
Mild Mercurous Chloride,	60 Gm. or 926 grains
Resin of Jalap, in fine powder,	20 Gm. or 308 grains
Gamboge, in fine powder,	15 Gm. or 231 grains
Diluted Alcohol, sufficient to make 1000 pills.	

"Mix the powders intimately, then incorporate a sufficient quantity of diluted alcohol to form a mass, and divide into 1000 pills." <U. S. Average dose.—2 pills.

Pills Cathartic Compound, Improved. Ext. colocynth 100 grains, ext. jalap, ext. gentian, each, 50 grains; podophyllum resin, leptandrin, ext. hyoscyamus, each, 25 grains; oil of peppermint q. s. Make 100 pills.

PILULÆ CATHARTICÆ VEGETABILES. U. S.

Vegetable Cathartic Pills.

Compound Extract of Colocynth,	60 Gm. or 925 grains
Extract of Hyoscyamus,	30 Gm. or 463 grains
Resin of Jalap,	20 Gm. or 308 grains
Extract of Leptandra,	15 Gm. or 231 grains
Resin of Podophyllum,	15 Gm. or 231 grains
Oil of Peppermint,	8 Cc. or 2 fl.drachms
Diluted Alcohol, a sufficient quantity to make 1000 pills.	

"Mix the compound extract of colocynth intimately with the resin of podophyllum, resin of jalap, and extract of leptandra, and then add the oil of peppermint. Rub the extract of hyoscyamus with enough diluted alcohol to render it plastic, then incorporate it with the mixture first prepared, using a sufficient quantity of diluted alcohol to form a mass, and divide it into 1000 pills." <U. S.

Average dose.—2 pills.

PILULA COLOCYNTHIDIS COMPOSITA. Br.**Compound Pill of Colocynth.**

Colocynth pulp, in powder,	1	ounce	or 20 Gm.
Barbados Aloes, in powder,	2	ounces	or 40 Gm.
Scammony Resin, in powder,	2	ounces	or 40 Gm.
Potassium Sulphate, in powder,	$\frac{1}{4}$	ounce	or 5 Gm.
Oil of Cloves,	2	fl.drachms	or 5 Cc.

Distilled Water, a sufficient quantity.

Triturate the oil of cloves with the potassium sulphate, add the colocynth pulp, mix, add the Barbados aloes and the scammony resin; after mixing intimately add the distilled water and beat to form a mass. Dose, 4 to 8 grains. <Br.

PILULA COLOCYNTHIDIS ET HYOSCYAMI. Br.**Pill of Colocynth and Hyoscyamus.**

Compound Pill of Colocynth,	2	ounces	or 50 Gm.
Extract of Hyoscyamus,	1	ounce	or 25 Gm.

Mix to form a pill. Dose, 4 to 8 grains. <Br.

PILULA FERRI. Br. Iron Pill.

Exsiccated Ferrous Sulphate, in fine powder,	150	grains	or 15 Gm.
Exsiccated Sodium Carbonate, in fine powder,	95	grains	or 9.5 Gm.
Gum Acacia, in powder,	50	grains	or 5 Gm.
Tragacanth, in powder,	15	grains	or 1.5 Gm.
Syrup,	150	grains	or 15 Gm.
Glycerin,	10	grains	or 1 Gm.
Distilled Water,	20	grains	or 2 Gm.

or a sufficient quantity.

To the liquids, previously mixed, add the ferrous sulphate; mix; add quickly the sodium carbonate; mix; set aside for 15 minutes, or until the reaction is complete; add the gums and incorporate thoroughly. <Br.

If divided into 5 grain pills each pill will contain about 1 grain ferrous carbonate. Dose, 5 to 15 grains.

Although this formula is not designated in the Br. P. as Blaud's Pills, it is similar to the pills familiarly known by that name.

PILULÆ FERRI CARBONATIS. U. S.**Pills of Ferrous Carbonate. Blaud's Pills. Chalybeate Pills.**

Granulated Ferrous Sulphate,	16	Gm. or 247	grains
Potassium Carbonate,	8	Gm. or 123	grains
Sugar,	4	Gm. or 62	grains

Althæa, in No. 60 powder,	1 Gm. or 15 grains
Tragacanth, in fine powder,	1 Gm. or 15 grains
Glycerin,	
Water, each, a sufficient quantity.	

"Rub the potassium carbonate in a mortar with a sufficient quantity (about 10 drops each) of glycerin and water, then add the ferrous sulphate and sugar, previously triturated together to a uniform powder and rub the mass thoroughly until it assumes a greenish color. When the reaction has terminated, incorporate the tragacanth and althæa, and, if necessary, add a little more water so as to obtain a mass of pilular consistence. Divide this into 100 pills. These pills should be freshly prepared when wanted." <U. S. Average dose.—2 pills.

Blaud's Pills, as found on the market, are made in 1, 2, 3 and 5 grain sizes. They are generally either polished as directed in the following formula, or silver-coated, in 3 and 5 grain sizes. Many combinations, also, of Blaud's Pills with other medicaments are furnished by manufacturers.

PILULÆ FERRI IODIDI. U. S.

Pills of Ferrous Iodide. Blancard's Pills.

Reduced Iron,	4 Gm. or 62 grains
Iodine,	5 Gm. or 77 grains
Glycyrrhiza, in No. 60 powder,	4 Gm. or 62 grains
Sugar,	4 Gm. or 62 grains
Extract of Glycyrrhiza, in powder,	1 Gm. or 15 grains
Acacia,	1 Gm. or 15 grains
Water, Balsam of Tolu and Ether, of each, a sufficient quantity, to make 100 pills.	

"To the reduced iron contained in a small mortar, add 6 Cc. (or 2 fl.drachms) of water, and then, gradually, the iodine, with constant stirring, until the mixture ceases to have a reddish tint. Then add the remaining powders, previously well mixed together, and mix the whole thoroughly. Transfer the mass to a porcelain dish and evaporate the excess of moisture on a water-bath, with constant stirring, until the mass has acquired a pilular consistence. Then divide it into 100 pills." <U. S.

For coating the pills to preserve them and give a polish: "Dissolve 10 gm. (or 150 grains) of balsam of tolu in 15 Cc. (or 1½ fl.ounces) of ether, and shake the pills with a sufficient quantity of the solution until they are uniformly coated, then put them on a plate to dry, occasionally rolling about until the drying is completed. Keep the pills in a well-stoppered bottle." <U. S.

Average dose.—2 pills.

PILULA GALBANI COMPOSITA. Br.

Compound Pill of Galbanum. Compound Pill of Asafetida.

Asafetida,	2 ounces or 50 Gm.
Galbanum,	2 ounces or 50 Gm.
Myrrh,	2 ounces or 50 Gm.
Syrup of Glucose,	1 ounce or 25 Gm.
or a sufficient quantity.	

"Heat all together on a water-bath, stirring until the mass is uniform in consistence. Dose, 4 to 8 grains." <Br.

PILULA HYDRARGYRI. Br. Mercury Pill.

Blue Pill. [Massa Hydrargyri. U. S.].

Mercury,	2 ounces or 40 Gm.
Confection of Rose,	3 ounces or 60 Gm.
Licorice Root, in fine powder,	1 ounce or 20 Gm.

Rub the mercury with the confection of rose until metallic globules are no longer visible; add the licorice root; beat together until thoroughly mixed. Dose, 4 to 8 grains. <Br.

PILULA HYDRARGYRI SUBCHLORIDI COMPOSITA. Br.

Compound Pill of Mercurous Chloride.

Compound Calomel Pill. Plummer's Pill.

Mercurous Chloride,	1 ounce	or 25	Gm.
Sulphurated Antimony,	1 ounce	or 25	Gm.
Guaiacum Resin, in powder,	2 ounces	or 50	Gm.
Castor Oil,	180 grains	or 10.3	Gm.
Alcohol, (90%),	1 fl.drachm	or 3	Cc.

or a sufficient quantity.

Mix to form a mass. Dose, 4 to 8 grains.

PILULA IPECACUANHÆ CUM SCILLA. Br.

Pill of Ipecacuanha with Squill.

Compound Powder of Ipecacuanha,	3 ounces or 30 Gm.
Squill, in powder,	1 ounce or 10 Gm.
Ammoniacum, in powder,	1 ounce or 10 Gm.
Syrup of Glucose, a sufficient quantity.	

Mix to form a mass. Dose, 4 to 8 grains. This pill contains about 5 percent. of opium. <Br.

PILULÆ LAXATIVÆ COMPOSITÆ. U. S.

Compound Laxative Pills.

Aloin,	1.30 Gm. or 20 grains
Strychnine,	0.05 Gm. or $\frac{4}{5}$ grain
Extract of Belladonna Leaves,	0.80 Gm. or $12\frac{1}{3}$ grains
Ipecac, in fine powder,	0.40 Gm. or 6 grains

Glycyrrhiza, in fine powder, 4.60 Gm. or 71 grains
Syrup, a sufficient quantity
To make 100 pills

The ingredients (except the syrup) are to be triturated together, so as to produce a uniform powder, and with the syrup made into a mass which is to be made into 100 pills.

These pills are similar to those furnished by the leading manufacturers of pills, and sold under similar titles.

Average dose.—2 pills.

PILULÆ OPII. U. S. Pills of Opium.

Powdered Opium, 6.5 Gm. or 100 grains
Soap, in fine powder, 2.0 Gm. or 31 grains
Water, a sufficient quantity to make 100 pills.

"Mix the powders intimately, then incorporate sufficient water to form a mass and divide it into 100 pills." <U. S.

Average dose.—1 pill.

PILULÆ PHOSPHORI. U. S., Br. Pills of Phosphorus.

The U. S. formula is:

Phosphorus, 0.06 Gm. or 1 grain
Althæa, in No. 60 powder, 6.00 Gm. or 93 grains
Acacia, in fine powder, 3.00 Gm. or 47 grains
Water, Glycerin, Chloroform, Balsam
of Tolu and Ether, of each,
a sufficient quantity to make 100 pills.

Dissolve the phosphorus in a test tube, in 5 Cc. (or 81 minims) of chloroform with the aid of a very gentle heat, replacing from time to time any of the chloroform which may have been lost by evaporation. Mix the acacia and althæa in a mortar; next add the solution of phosphorus, then immediately afterwards, a sufficient quantity, about 4 Cc. (or 65 minims) of a mixture of 2 volumes of glycerin, with 1 volume of water, and quickly form a mass which is to be divided into 100 pills. The pills are then to be coated or varnished with a solution of 10 Gm. (or 150 grains) of balsam of tolu in 15 Cc. (or $\frac{1}{3}$ fl.ounce) of ether and dried. <U. S. Average dose, 1 pill.

Pilula Phosphori. Br. Phosphorus Pill. Phosphorus 10 grains (or 1 Gm.), white beeswax, melted, 125 grains (or 12.5 Gm.); lard, melted, 125 grains (or 12.5 Gm.); kaolin 115 grains (or 11.5 Gm.); carbon bisulphide 33 minims (or 3 Cc.), or a sufficient quantity.

"Place the melted wax and lard in a warmed mortar and stir until the mixture has the consistence of cream. Dissolve the phosphorus in the carbon bisulphide and carefully mix the solution with the melted fats; add the kaolin; mix well together. Keep the mixture immersed in cold water in a bottle from which the light is excluded. When dis-

pensed, every 3 grains of the mixture is to be incorporated with 1 grain of gum acacia in powder, and the resulting pills should be varnished. Phosphorus pill, including the gum acacia, contains 2 per cent. of phosphorus. Dose, 1 to 2 grains." < Br.

PILULA PLUMBI CUM OPIO. Br. Pill of Lead with Opium.

Lead Acetate, in fine powder,	36 grains or 6 Gm.
Opium, in powder,	6 grains or 1 Gm.
Syrup of Glucose,	4 grains or 0.7 Gm.
or a sufficient quantity.	

Mix to form a pill mass. Dose, 2 to 4 grains. This pill contains about 12½ percent. of opium.

PILULÆ PODOPHYLLI, BELLADONNÆ ET CAPSICI. U. S.

Pills of Podophyllum, Belladonna and Capsicum.

Resin of Podophyllum,	1.6 Gm. or 25 grains
Extract of Belladonna Leaves,	0.8 Gm. or 12½ grains
Capsicum, moderately fine powder,	3.2 Gm. or 50 grains
Sugar of Milk, in fine powder,	6.5 Gm. or 100 grains
Acacia, in fine powder,	1.6 Gm. or 25 grains
Glycerin,	

Syrup, each, a sufficient quantity to make 100 pills

The resin of podophyllum, capsicum, sugar of milk and acacia are to be triturated together to a uniform powder which is to be incorporated with the extract of belladonna leaves and a sufficient quantity of glycerin and syrup mixed in equal parts to form a mass which is to be divided into 100 pills.

Average dose.—1 pill.

PILULA QUININÆ SULPHATIS. Br. Pill of Quinine Sulphate.

Quinine Sulphate,	30 grains or 3 Gm.
Tartaric Acid, in powder,	1 grain or 0.1 Gm.
Glycerin,	4 grains or 0.4 Gm.
Tragacanth, in powder,	1 grain or 0.1 Gm.

"Triturate the quinine sulphate with the tartaric acid; add the product to the previously mixed glycerin and tragacanth; make a mass. Dose, 2 to 8 grains." < Br.

PILULÆ RHEI COMPOSITÆ. U. S., Br.

Compound Pills of Rhubarb.

Rhubarb, in No. 60 powder,	13 Gm. or 200 grains
Purified Aloes, in fine powder,	10 Gm. or 154 grains
Myrrh, in fine powder,	6 Gm. or 93 grains
Oil of Peppermint,	0.5 Cc. or 8 minims
Water, a sufficient quantity to make 100 pills.	

"Mix the oil of peppermint intimately with the powders, then incorporate sufficient water to form a mass; divide it into 100 pills." <U. S. Average dose, 2 pills.

Pilula Rhei Composita. Br. Compound Rhubarb Fill. Rhubarb root, in powder, 3 ounces (or 60 Gm.); Socotrine aloes, in powder, $2\frac{1}{4}$ ounces (or 45 Gm.); myrrh, in powder, $1\frac{1}{2}$ ounces (or 30 Gm.); hard soap, in powder, $1\frac{1}{2}$ ounces (or 30 Gm.); oil of peppermint $1\frac{1}{2}$ fl.drachms (or 3.75 Cc.); syrup of glucose $2\frac{3}{4}$ ounces (or 55 Gm.), or sufficient. Mix to form a mass. Dose, 2 to 8 grains. <Br.

PILULA SAPONIS COMPOSITA. Br.

Compound Pill of Soap.

Opium, in powder,	$\frac{1}{2}$ ounce or 10 Gm.
Hard Soap, in powder,	$1\frac{1}{2}$ ounces or 30 Gm.
Syrup of Glucose,	$\frac{1}{2}$ ounce or 10 Gm.

"Mix to form a mass. Dose, 2 to 4 grains. This pill contains 20 percent. of opium." <Br. This should more properly be entitled "Pilula Opii," as that is the only active ingredient. See Pilulæ Opii.

PILULA SCAMMONII COMPOSITA. Br.

Compound Scammony Pill.

Scammony Resin,	1 ounce or 25 Gm.
Jalap Resin,	1 ounce or 25 Gm.
Curd Soap,	1 ounce or 25 Gm.
Tincture of Ginger,	3 fl.ounces or 75 Cc.

"Add the tincture of ginger to the soap and resins; dissolve with the aid of slight heat; evaporate on a water-bath until the mass has acquired a suitable consistence for forming pills. Dose, 4 to 8 grains." <Br.

PILULA SCILLÆ COMPOSITA. Br.

Compound Squill Pill.

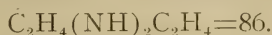
Squill, in powder,	$1\frac{1}{4}$ ounces or 25 Gm.
Ginger, in powder,	1 ounce or 20 Gm.
Ammoniacum, in powder,	1 ounce or 20 Gm.
Hard Soap, in powder,	1 ounce or 20 Gm.
Syrup of Glucose,	1 ounce or 20 Gm.

or a sufficient quantity.

"Mix to form a mass. Dose, 4 to 8 grains." <Br.

PIPERAZINUM. Piperazine.

Piperazidine. Diethelen-diamine:



This is a synthetic alkaloid produced by the action of ammonia upon Ethylene chloride. It is in colorless hygroscopic lustrous crystals, very freely soluble in water, in which it makes a strongly alkaline

but almost tasteless solution. It is employed as an antilithic in rheumatism, gout etc., and is highly recommended as a solvent for uric acid. It is official in the Ger. S. and a number of compounds somewhat used in medicine are prepared.

Dose, 15 to 30 grains daily in carbonated or lithiated water.

Piperazine Quinate. This is a compound of piperazine with quinine, readily soluble in water. It is recommended for gout, renal calculi and other uric acid complications. Dose 15 to 20 grains. It is known in the market as **Sidonal**.

Piperazine Salicylate. A chemical compound of piperazin 1 molecule with salicylic acid 2 molecules. Soluble in water, alcohol or ether and recommended as a rheumatic remedy. Dose 5 to 10 grains.

Piperazine Sulphoichthyolate. A combination of piperazin with ichthyol. It is recommended as a remedy for gout. Dose 15 grains, preferably in sugar-coated tablets, because of its disagreeable taste. This compound is better known as **Ichthyolidin**.

PIPERINA. U. S. Piperine.



"A feebly basic substance $[\text{CH}_2\text{O}_2\cdot\text{C}_6\text{H}_3\text{CH}:\text{CH}\cdot\text{CH}:\text{CH}\cdot\text{CON}\cdot\text{C}_3\text{H}_{10}]$ obtained from pepper and other plants of the *Piperaceæ*." <U. S.

It is insoluble in water; soluble in 15 parts alcohol, 36 parts of ether, and in 1.7 parts of chloroform at 25°C. (77°F.).

It may be used internally in pills or solution or externally in alcoholic solution as a stimulating application. A few drops of solution in water makes an excellent gargle for diphtheria or catarrhal sore throat.

Average dose.—0.200 Gm.=200 milligrammes (3 grains).

Piperidine Bitartrate. This is a bitartrate of piperidin recommended as a uric acid solvent. Dose 10 to 15 grains.

Piperidine Guaiacolate, better known by its trade name **Guaiaiperol**. It is a chemical compound of piperidine with guaiacol, recommended in the treatment of phthisis. Dose 2 to 5 grains.

PIX — PITCH.

Under the generic title **Pix** a number of preparations are official in the pharmacopœias. They consist of resinous or bituminous substances, prepared in various ways, and are similar to, but more plastic than resins, some of them being semi-liquid. The following are official:

PIX BURGUNDICA. Br. Burgundy Pitch.

"The resinous exudation obtained from the stem of *Picea Excelsa*, melted and strained." <Br.

The Burgundy Pitch of commerce varies considerably according to its source. The Br. Burgundy pitch is obtained from the Norway spruce, while much that is in the market is obtained in countries further south, from *Abies picea*, the European silver fir tree. It is called **Pix Alba** in some countries.

It contains a small quantity of terpene, $C_{10}H_{16}$, and a little water, but is chiefly composed of resin. It is used in making plasters and sealing wax, grafting wax etc. True Burgundy pitch is almost entirely soluble in double its weight of glacial acetic acid.

PIX CARBONIS PRÆPARATA. Br. Prepared Coal Tar.

"Prepared by placing commercial coal tar in a shallow vessel and maintaining it at a temperature of $120^{\circ}F.$ ($48.9^{\circ}C.$), for 1 hour, stirring constantly." <Br.

Whenever coal tar is directed to be used in medicine the prepared, as above, should be used.

PIX CANADENSIS. Canada Pitch. Hemlock Pitch.

The prepared resinous exudation of *Abies Canadensis*, consisting mainly of resins, with a little terpene and water. The resinous exudate from hemlock trees is collected and boiled in water, and the mass which rises to the surface strained while hot, the strained product being hemlock pitch or hemlock gum which is used chiefly for making plasters.

PIX PINI. White Pine Pitch.

The pitchy substance which exudes from pine trees when cut or tapped. When first obtained it is soft and semi-liquid, and is commonly known as "pitch." When exposed it hardens and is known in pharmacy as turpentine, or white pine turpentine or gum. The soft pitch is frequently used in making plasters and ointments.

PIX JUNIPERI. Juniper Tar.

This is produced by the dry distillation of the stems and roots of *Juniperus Communis*. It is official in the *Port. Pharm.*

It differs somewhat from Oil of Cade, which is prepared from the heart-wood of juniper by a similar process, and is known as Juniper Tar Oil. See *Oleum Cadinum*.

PIX LIQUIDA. U. S., Br. Tar.

"A product obtained by the destructive distillation of the wood of *Pinus palustris*, Miller; or of other species of *Pinus* (Fam. *Pinaceæ*)." <U. S.

"A bituminous liquid obtained from the wood of *Pinus Sylvestris*, and other species of *Pinus*, by destructive distillation. Known in commerce as Stockholm tar." <Br.

It will be seen that U. S. and Br. tars are somewhat different, corresponding with the difference in the woods from which they are produced. Several other varieties of tar are obtained from other woods, as birch tar, juniper tar etc. Tar is also obtained as a by-product of charcoal manufacture, or the manufacture of acetic acid from wood.

It consists of volatile products, as oil of tar, creosote etc., which may be vaporized by heat, and a black mass, solid when cool, known as **black pitch**. Sometimes used as an ingredient in plasters and in shoemaker's wax etc.

Among the many substances which have been isolated from tar may be mentioned toluene, xylene, cresol, guaiacol and naphthalene, pyrene, metol, chrysene, pyrocatechin etc.

Pixol. Resol. This is a preparation of wood-tar, resembling lysol, which is from coal-tar.

PIX LITHANTHRACIS. Pyroleum Lithanthracis. Coal Tar.

Coal-tar is a residue left after the dry distillation of coal, in the manufacture of illuminating gas. It is extensively used in the arts and for building purposes, and in chemistry is the source of a great number of chemical products. The more important of these are mentioned under other headings, as phenol, benzol, aniline etc.

When coal-tar is distilled and the product rectified, the lighter products which come over are separated as a brown, oily liquid, known as light oil, and consisting of benzol, C_6H_6 ; toluol, C_7H_8 ; xylol, C_8H_{10} ; and several other similar substances. Then a black liquid which is called "dead oil" is distilled. This contains aniline, naphthaline, $C_{10}H_8$; phenol, anthracen and some other substances.

The residue which is not volatilized is a pitch known as Asphalt, which comprises about two-thirds of the original volume of coal-tar.

PIX NAVALIS. Pix Nigra. Black Pitch.

This is the residue left after distilling off the volatile portions from tar. It is official under various names in most of the European pharmacopœias. In pharmacy it is frequently used in making plasters and sticking applications.

PLATINUM.

Symbol Pt ; Atomic weight ($O=16$) 195.2; Sp. gr. 21.5.

Platinum was discovered by Wood, of Jamaica, in 1741. It more nearly resembles gold in its characteristics than any of the other metals, and is sometimes called "white gold." It is a grayish-white metal, one of the heaviest substances known, and is chiefly obtained from sand or alluvial soils, the debris of volcanic rocks, in the form of small grains or small rolled masses associated with other metals. Its rarity makes it as expensive as gold, and it is used only to a limited extent in the arts, and scarcely at all in pharmacy or medicine, but in chemistry its uses are important, and some of its salts are useful in photography. It is further described in the Chemical Section of this work, Part I.

Platinum Black is platinum in a very fine state of division, and is used for electrical and chemical tests, it having the power of absorbing

oxygen and then imparting it to other combustible substances, thus causing their oxidation.

Platini Chloridum. Platinum Chloride. This was formerly an official salt of platinum, used only in test solution. It is made by dissolving platinum in nitro-hydrochloric acid to saturation, and then evaporating the solution to dryness.

Like gold, platinum forms double salts with ammonium, sodium and potassium chlorides. They may be made in the same manner as gold and sodium chloride, which see.

Spongy Platinum or Platinum Sponge. This is made by heating ammonio-chloride of platinum to redness, by which ammonia and chlorine are volatilized, leaving platinum metal in spongy form, suited for the absorption of oxygen.

Oxides of Platinum. With oxygen platinum forms two oxides: platinous oxide, PtO ; and platonic oxide, PtO_2 .

PLUMBUM — LEAD.

Symbol Pb; Atomic weight ($\text{O}=16$) 207.10; Sp. gr. 11.45.

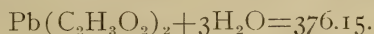
Lead is a soft, bluish, elementary metal, similar in chemical characteristics to copper, silver and mercury, but widely differing from them in physical properties. It is obtained chiefly from the native sulphide, galena, or lead ore, in which it is often associated with silver and other metals in small proportion. The galena is roasted in reverberatory furnaces to drive off the sulphur, and the residue smelted with coal and lime, the lead being drawn off and cast into "pigs."

Lead and its compounds are further described in the Chemical Section, Part I.

Metallic lead is largely employed for industrial purposes, but its salts only are used in pharmacy and medicine.

The following salts of lead are official in the U. S. and Br. pharmacopœias:

PLUMBI ACETAS. U. S., Br. Lead Acetate. Sugar of Lead.



"It should contain not less than 99.5 percent. of pure Lead Acetate $[(\text{CH}_3\cdot\text{COO})_6\text{Pb} + 3\text{H}_2\text{O}]$, and should be kept in well-stoppered bottles." < U. S.

"A salt, $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 3\text{H}_2\text{O}$, obtained by dissolving lead oxide or lead carbonate in acetic acid." < Br.

No formula is given for the preparation of this salt in the present U. S. or Br. P. The following formula was official in the Br. P.:

Lead Oxide, in fine powder,	24 ounces av.
Acetic Acid, a sufficiency, about	38 fl.ounces
Distilled Water,	20 fl.ounces

Mix the acetic acid and water, add the lead oxide and dissolve with the aid of a little heat, filter, evaporate till a pellicle forms, and set aside to crystallize, first adding a little acetic acid should the fluid not have a distinctly acid reaction. Drain and dry the crystals on filtering paper, without heat.

This salt is soluble in 2 parts of water and in 30 parts of alcohol at 25°C. (77°F.); in 0.5 part of boiling water and in 1 part of boiling alcohol. When heated to 40°C. (104°F.), it loses its water of crystallization (14.25 percent.). It fuses at 200°C. (392°F.), with loss of acetic acid.

Uses. The commercial salt is impure and should not be used medicinally, but is extensively employed in the arts, especially as a mordant for dyeing. The pure salt is a sedative and astringent. It is used internally in the form of pills and powders, and externally in solutions and other forms of application.

Average dose.—0.065 Gm.=65 milligrammes (1 grain).

PLUMBI CARBONAS. Br. Lead Carbonate. White Lead.

"Lead carbonate, or hydroxy-carbonate, $2\text{PbCO}_3 \cdot \text{Pb}(\text{OH})_2$, may be prepared by the interaction of lead carbonate and carbonic anhydride, in the presence of vapors of acetic acid." <Br.

This salt is manufactured on a large scale for paint and other purposes by exposing lead in thin discs to the action of acetic acid, carbon dioxide and the atmosphere. For medicinal use it should be purified.

It is insoluble in water or alcohol, but soluble in dilute nitric acid or acetic acid, with evolution of CO_2 .

Uses. Commercial white lead is extensively used in the arts for painting and other purposes. In medicine it is used in the form of an ointment and suspended in water for external application.

PLUMBI IODIDUM. U. S., Br. Lead Iodide.

$\text{PbI}_2=457.15$.

"It should contain not less than 99 percent. of pure Lead Iodide, and should be kept in well-stoppered bottles, protected from light." <U. S.

"Precipitated Lead Iodide, PbI_2 , is obtained by the interaction of lead nitrate or acetate and potassium iodide." <Br.

No formula for this salt is at present official in the U. S. or Br. P., but the 1885 Br. P. directed it to be made as follows:

Lead Nitrate,	4 ounces av.
Potassium Iodide,	4 ounces av.
Distilled Water, a sufficiency.	

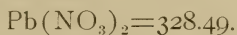
Dissolve the lead nitrate by the aid of heat in 30 ounces of water, and the potassium iodide in 10 ounces of water and mix the solutions.

Collect the precipitate on a filter, wash it with distilled water, and dry in a warm place.

Soluble in about 1300 parts of water at 25°C. (77°F.), and in about 200 parts of boiling water; almost insoluble in alcohol.

Uses. This salt is used in pharmacy for preparing ointment and plasters, and sometimes suspended in water as an application.

PLUMBI NITRAS. U. S. Lead Nitrate.



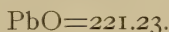
"It should contain not less than 99.5 percent. of pure Lead Nitrate, $[(\text{NO}_2\cdot\text{O})_2\text{Pb}]$, and should be kept in well-closed bottles." <U. S.

No formula for this preparation is official, but it may be made by adding lead oxide to nitric acid, diluted with an equal quantity of water, heating and dissolving the oxide to saturation in the liquid, then filtering and concentrating by evaporation and crystallizing.

Soluble in 1.85 parts of water at 25°C. (77°F.), almost insoluble in alcohol. In boiling water it is soluble in 0.75 part. <U. S.

Uses. This salt is used in solution as an external application, and for making hair restoratives is preferable to the acetate, as it has a less disagreeable odor.

PLUMBI OXIDUM. U. S., Br. Lead Oxide. Litharge.



"It should contain not less than 96 percent. of pure Lead Oxide, and should be kept in well-closed vessels." <U. S.

"Lead Oxide, PbO , is prepared by the action of air on melted lead." <Br.

This is oxide of lead which has been rendered semi-crystalline by incomplete fusion, and is hence called semi-vitrous lead oxide.

It may be prepared in a small way by heating lead nitrate in a platinum crucible until all its acid has been driven off, but, commercially, it is a by-product of extracting silver from lead ore.

Uses. Lead oxide is a working basis for many of the lead salts, and is used in making plasters and solutions for external use.

Other Salts of Lead.

Besides the official salts of lead which have been described, several others are occasionally used in pharmacy. They are noted in the Chemical Section, Part I.

POTASSIUM OR KALIUM.

Symbol K; Atomic weight 39.10; Sp. gr. 0.865.

Notice that the chemical symbol for Potassium is K. (Kalium).

Potassium is one of the group of three elementary substances (potassium, sodium, lithium), which, on account of their marked, positive characteristics are called alkali-metals. It was first isolated

and described by Sir H. Davy, in 1807, and is now chiefly obtained from its carbonate by heating it to a high degree with charcoal in a retort, when it distils over and is condensed in naphtha, cooled by ice. It is so readily oxidized that it must be preserved under naphtha or some other hydrocarbon. In water it burns violently, and in air is soon converted into an oxide. Its other properties and characteristics are similar to the alkali metals in general. It is more fully described in the Chemical Section, Part I.

Potassium is the basis of a great number of salts which are formed by its union with acids and negative elements. They are, as a class, very soluble, and are of great value in the industrial arts and in pharmacy and in medicine. Potassium derives its name from Potash, the chief source of the potassium salts. Potash was formerly made by evaporating the lye which is obtained by percolating or lixiviating wood ashes, but is now chiefly obtained by decomposing the native pure potassium chloride, obtained from mines in Germany. The salts of potassium are either alkaline, neutral or acid, according to the proportions in which they are combined. In German pharmacy they are called kalium salts. The salts of potassium official in the U. S. and Br. pharmacopœias constitute a large class, and are as follows:

POTASSA CAUSTICA. Br. Potassium Hydroxide.

Caustic Potash or Potassa. Potassium Hydrate.

[Potassii Hydroxidum. U. S.].

This is prepared by evaporating solution of potassa rapidly in a clean iron vessel until an oily fluid remains which will solidify on cooling. It is then poured into cylindrical molds to form "sticks," which, while still warm, are put into dry bottles and tightly sealed. It is sometimes made in the form of powder by stirring while cooling.

This is soluble in about 0.5 part of water and in 2 parts of alcohol at N. T. Very soluble in boiling water and in boiling alcohol.

Uses. This is used chiefly as a caustic for morbid growths, excrescences, warts etc., and in pharmacy may be used for preparing liquor potassa (which see), and many salts and preparations of potassium.

POTASSA CUM CALCE. Potassa with Lime.

Potassa,	500 Gm. or 1 ounce
Lime,	500 Gm. or 1 ounce

Rub them well together in a mortar so as to form a powder and keep in a well-stoppered bottle.

This powder is deliquescent when exposed to moist air; it is very strongly alkaline and is used as a caustic. It was formerly official in the U. S. P. but was dismissed in the 8th revision.

Uses. This is used as a caustic the same as potassa, but is milder and slower in its action. Being in powder it is sometimes more convenient.

POTASSA SULPHURATA. Br. Sulphurated Potassa.
Liver of Sulphur.

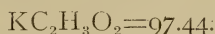
Sublimed Sulphur,	100 Gm. or 1 ounce
Potassium Carbonate,	200 Gm. or 2 ounces

Rub the potassium carbonate, previously dried, with the sulphur, and heat the mixture gradually in a covered crucible until it ceases to swell and is completely melted. Then pour the liquid on a marble slab, cover with an inverted basin, and when solidified and cold put into well-stoppered bottles. This is also known as liver of sulphur, and possesses a very disagreeable odor like rotten eggs.

This is soluble in 2 parts of water at N. T., but in alcohol only the potassium sulphide dissolves out. The aqueous solution is strongly alkaline.

Uses. It is sometimes given internally as an alterative and used externally in solutions for skin diseases and parasites. It is used by barbers for removing nitrate of silver stains.

POTASSII ACETAS. U. S., Br. Potassium Acetate.



"It should contain, when thoroughly dried, not less than 98 percent. of pure Potassium Acetate $[\text{CH}_3\cdot\text{COOK}]$, and should be kept in well-stoppered bottles." < U. S.

"Potassium acetate, $\text{CH}_3\cdot\text{COOK}$, is prepared by fusing the product of the interaction of acetic acid and potassium carbonate." < Br.

This may be made more conveniently by adding to pure acetic acid, crystals of potassium bicarbonate as long as effervescence ensues, then adding a very small quantity of acid and cautiously evaporating to dryness in a porcelain dish by means of a sand-bath.

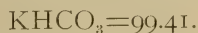
This salt rapidly deliquesces when exposed to air. Soluble in 0.4 part of water and in 2 parts of alcohol at 25°C (77°F .).

Uses. In medicine potassium acetate is employed as a diuretic and in larger doses as a laxative. It has proven effective in rheumatism, acting as a solvent to decompose uric acid; it is also given in certain forms of skin diseases.

Average dose.—2 Gm. (30 grains).

POTASSII BICARBONAS. U. S., Br.

Potassium Bicarbonate. Potassium Hydrogen Carbonate.



"It should contain not less than 99 percent. of pure Potassium Bicarbonate $[\text{CO}(\text{OH})(\text{OK})]$, and should be kept in well-stoppered bottles." < U. S.

"Potassium bicarbonate may be obtained by saturating a strong aqueous solution of potassium carbonate with carbonic anhydride."
<Br.

This salt may be made by passing a current of carbonic acid gas through a strong solution of potassium carbonate until it is entirely saturated, then filtering the liquid and evaporating at a temperature below 71°C . (160°F .), that it may not be decomposed, and crystallizing when sufficiently concentrated.

Commercially, crude potassium bicarbonate, which is called *Salaeratus*, is prepared by suspending a solution of potassium carbonate contained in an open vessel in the fermenting tuns of a brewery, thus utilizing the carbonic acid gas produced. When the solution is saturated it is evaporated to dryness.

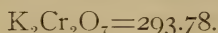
It is soluble in 3 parts of water at 25°C . (77°F .), nearly insoluble in alcohol. Twenty parts, by weight, of potassium bicarbonate are neutralized by 14 parts of citric acid, and by 15 parts of tartaric acid.

Uses. Potassium bicarbonate in crystals is largely used in pharmacy as a source of other potassium salts. It is less irritating than the carbonate, and is therefore administered internally when an alkaline salt of potassium is desired, as an antacid etc.

Average dose.—2 Gm. (3 grains).

POTASSII BICHROMAS. Br. Potassium Bichromate.

[Potassium Dichromate. U. S.]. Red Chromate of Potassium.



"Potassium bichromate, $\text{K}_2\text{CrO}_4\cdot\text{CrO}_3$, is obtained by roasting chrome iron-stone with lime in the presence of air, and by treating the resulting chromate with a potassium salt, and subsequently with an acid." <Br. (See Potassii Dichromas).

This is obtained from chrome iron ore by first roasting the ore, then powdering, mixing with potassium carbonate and chalk, and heating the mixture to a high temperature in the air. Ferric oxide and chromic acid are produced, the latter combining with the potassium carbonate and forming neutral potassium chromate with evolution of carbonic dioxide.

The solution of neutral potassium chromate which is obtained by lixiviation with water, is then treated with sulphuric or nitric acid, and the salt crystallized from the solution.

Soluble in 10 parts of water at N. T., insoluble in alcohol. In boiling water it is soluble in 1.5 parts.

Uses. This salt, which is also known as Red Chromate of Potassium, is used in pharmacy for making several preparations, and as a test-solution. The dose internally is $\frac{1}{10}$ to $\frac{1}{5}$ grain in solution. It is also extensively used in dyeing.

POTASSII BITARTRAS. U. S. Potassium Bitartrate.

Potassii Tartras Acidus. Br. Acid Potassium Tartrate.

[Cream of Tartar].



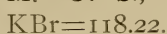
"It should contain not less than 99 percent. of pure Potassium Bitartrate $[\text{C}_2\text{H}_2(\text{OH})_2(\text{COOH})(\text{COOK})]$, and should be kept in well-stoppered bottles." < U. S.

This is an acid salt of potassium prepared from Crude Tartar or Argols, which is deposited in wine casks during and after the fermentation of grape juice. It is purified and decolorized by dissolving in hot water and filtering the solution through animal charcoal, then concentrating and crystallizing.

Soluble in about 200 parts of water at 25°C. (77°F.), and in 16.7 parts of boiling water, only slightly soluble in alcohol.

Uses. Cream of tartar is extensively used as the acid basis of baking powder and for other culinary purposes. In medicine it is considerably employed as a mild acid, laxative and blood purifier.

Average dose.— 2 Gm. (30 grains).

POTASSII BROMIDUM. U. S., Br. Potassium Bromide.

"It should contain not less than 97 percent. of pure Potassium Bromide, and should be kept in well-stoppered bottles." < U. S.

"Potassium Bromide, KBr, may be obtained by adding a slight excess of bromine to a strong solution of potassium hydroxide, evaporating the solution of potassium bromide and bromate to dryness, decomposing the mixture with charcoal, and purifying by crystallization." < Br.

Another process is to decompose a solution of iron bromide with potassium carbonate, iron carbonate being precipitated, and the solution, which contains potassium bromide, filtered, concentrated and crystallized.

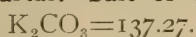
Soluble in about 1.5 parts of water and in 180 parts of alcohol at 25°C. (77°F.), and in about 1 part of boiling water, and in 4 parts of glycerin at N. T.

Uses. Potassium bromide is one of the most valuable salts used in medicine. It is much employed as a nervine and sedative.

Average dose.— 1 Gm. (15 grains).

POTASSII CARBONAS. U. S., Br. Potassium Carbonate.

[Sal Tartar. Salt of Tartar].



"It should contain, when thoroughly dried, not less than 98 percent. of pure Potassium Carbonate $[\text{CO}(\text{OK})_2]$, and should be kept in well-stoppered bottles." < U. S.

"Potassium Carbonate, K_2CO_3 , associated with either one or two molecules of water. It may be obtained from the ashes of wood, or by the interaction of crude potassium sulphate and crude calcium carbonate and carbon." <Br.

This salt is obtained from commercial Pearlash (impure carbonate of potash) by dissolving it in an equal weight of cold water, allowing to stand a day or two, filtering the solution and evaporating the filtrate by gentle heat until it thickens, then removing it from the fire and stirring it constantly with an iron spatula until it is in the form of a granular salt, which is known familiarly as "Salt of Tartar."

It deliquesces rapidly when exposed to air. Soluble in 0.91 part of water at $25^\circ C.$ ($77^\circ F.$), and in about 0.65 part of boiling water; insoluble in alcohol. It is strongly alkaline and combines with acids with evolution of CO_2 .

Uses. This is considerably used as a basis of other potassium salts and, in solution, 1 ounce in 1 gallon of water, makes the Liquid Shampoo commonly used by barbers. As a medicine it is employed internally as an antacid in solution, and externally in some ointments and lotions. Average dose, internally, largely diluted, 1 Gm. (15 grains).

POTASSII CHLORAS. U. S., Br. Potassium Chlorate.



"It should contain not less than 99 percent. of pure Potassium Chlorate [$ClO_2 \cdot OK$], and should be kept in well-stoppered bottles." <U. S.

"Potassium Chlorate, $KClO_3$, is obtained by passing chlorine into water holding lime or magnesia in suspension, treating the clarified liquid with potassium chloride, and subsequently crystallizing the potassium chlorate." <Br.

The Pharmacopœia directs caution in handling and mixing potassium chlorate on account of the liability of explosions when mixed with certain organic matter, as cork, tannic acid, sugar etc., or with sulphur, antimony sulphide, phosphorus or other easily oxidizable substances, care should also be taken in heating it, or in pounding in a mortar with other substances.

Soluble in 16 parts of water at $25^\circ C.$ ($77^\circ F.$), and in 1.7 parts of boiling water, insoluble in alcohol. It fuses at $334^\circ C.$ ($633^\circ F.$), and above $352^\circ C.$ ($665^\circ F.$), it is decomposed into oxygen and potassium perchlorate, about $400^\circ C.$ ($752^\circ F.$), it parts with all its oxygen, amounting to nearly 40 percent.

Uses. Potassium chlorate is extensively used as a source of oxygen and in pyrotechnics. In medicine it is used for sore throat, scarlet fever etc., in doses of 2 to 20 grains. It is quite popular in the form of tablets and lozenges.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

POTASSII CITRAS. U. S., Br. Potassium Citrate.

"It should contain not less than 99 percent. of pure Potassium Citrate $[\text{C}_3\text{H}_4(\text{OH})(\text{COOK})_3 + \text{H}_2\text{O}]$, and should be kept in well-stoppered bottles." <U. S.

"Potassium Citrate, $\text{C}_3\text{H}_4\cdot\text{OH}\cdot(\text{COOK})_3$, is prepared by the interaction of citric acid and potassium carbonate." <Br.

This salt is conveniently made by adding potassium bicarbonate to a strong solution of citric acid until it no longer effervesces, then filtering the solution and evaporating to dryness.

The 1885 Br. P. directed 8 ounces, or a sufficiency of carbonate of potassium, 6 ounces, or a sufficiency of citric acid, and 40 fl.ounces of water.* The acid is to be dissolved in the water and enough carbonate of potassium added to make the solution neutral, then filtered and evaporated to dryness.

Soluble in 0.5 part of water at 25°C. (77°F.), and very soluble in boiling water, but slightly soluble in alcohol.

Uses. This salt is considerably used in elixirs and other preparations, and in medicines as a diaphoretic and refrigerant.

Average dose.—1 Gm. (15 grains).

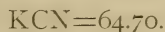
POTASSII CITRAS EFFERVESCENS. U. S.**Effervescent Potassium Citrate.**

Potassium Citrate,	200 Gm. or 7	oz. av. + 24 gr.
Sodium Bicarbonate,	477 Gm. or 16	oz. av. + 361 gr.
Tartaric Acid,	252 Gm. or 8	oz. av. + 389 gr.
Citric Acid,	162 Gm. or 5	oz. av. + 312 gr.

To make about 1000 Gm. or 35¼ ounces av.

The potassium citrate is to be dried on a water-bath until it ceases to lose weight, the sodium bicarbonate and tartaric acid are to be dried and powdered and the citric acid in uneffloresced crystals, is to be powdered. The powders are to be thoroughly mixed and placed on a plate of glass or in a suitable dish in an oven heated between 93° and 104°C. (199.4° and 219.2°F.). When the mixture, by the aid of careful manipulation with a wooden spatula, has acquired a moist consistence, it is to be rubbed through a No. 6 tinned-iron sieve, and the granules dried at a temperature not exceeding 54°C. (129.2°F.). Keep the product in well-stoppered bottles.

This is to be drunk in a third of a glass of cold water, during effervescence. Average dose, 4 Gm. (60 grains).

POTASSII CYANIDUM. U. S. Potassium Cyanide.

"It should contain not less than 95 percent. of pure Potassium Cyanide, and should be kept in well-stoppered bottles." <U. S.

This may be prepared according to the former Br. P. process by heating potassium ferrocyanide at a red heat until the gas ceases to be evolved, allowing the sediment to subside in the still molten mass, and pouring off the clear liquid. This is called fused Cyanide of Potassium. If desired to be purified, it may be dissolved in spirit, the solution filtered and concentrated by evaporation, and then crystallized.

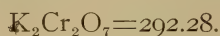
Soluble in about 2 parts of water at 25°C. (77°F.), and in about its own weight of boiling water, almost insoluble in alcohol. It is strongly alkaline.

Uses. In pharmacy this is used in making several preparations and in medicine it is employed as a sedative the same as hydrocyanic acid.

Average dose.—0.010 Gm.=10 milligrammes ($\frac{1}{5}$ grain).

This is now extensively used in extracting gold and silver from low grade ores.

POTASSII DICHROMAS. U. S. Potassium Dichromate.



[Potassii Bichromas. Pharm. 1890].

"It should contain not less than 99 percent. of pure Potassium Dichromate [$\text{Cr}_2\text{O}_5(\text{OK})_2$], and should be kept in well-stoppered bottles." <U. S. (See Potassii Bichromas).

Soluble in about 9 parts of water at 25°C. (77°F.), and in 1.5 parts of boiling water, insoluble in alcohol.

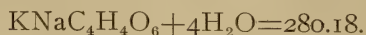
Average dose.—0.010 Gm.=10 milligrammes ($\frac{1}{5}$ grain).

POTASSII ET SODII TARTRAS. U. S.

Potassium and Sodium Tartrate. U. S. [Rochelle Salt].

Soda Tartarata. Br. Tartarated Soda.

Sodium Potassium Tartrate.



"It should contain not less than 99 percent. of pure Potassium and Sodium Tartrate [$\text{C}_2\text{H}_2(\text{OH})_2(\text{COOK})(\text{COONa})+4\text{H}_2\text{O}$], and should be kept in well-stoppered bottles." <U. S.

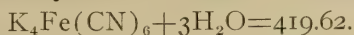
This may be made by dissolving 12 ounces av. of sodium carbonate in 5 pints of boiling water, adding 16 ounces av. of potassium bitartrate (cream of tartar) to the solution, boiling for a few moments and then testing to see if the solution is neutral, and adding a little of either of the salts to make it so if it is not. It is then evaporated until a pellicle begins to form, and set aside to crystallize.

Soluble in 1.2 parts of water at 25°C. (77°F.), and in less than its own weight of boiling water, nearly insoluble in alcohol.

Uses. Rochelle salt is usually powdered for convenient use, and is employed in pharmacy for making seidlitz powders, and in medicine is much used as a laxative and cathartic. Average dose.—8 Gm.

POTASSII FERROCYANIDUM. U. S.

Potassium Ferrocyanide. Yellow Prussiate of Potash.



“It should contain not less than 99 percent. of pure Potassium Ferrocyanide, and should be kept in well-stoppered bottles.” < U. S.

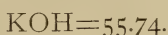
This is obtained by heating refuse animal substances, such as horns, hoofs, skins etc., with crude potash in an iron kettle, then lixiviating or percolating the mass with hot water, treating with freshly precipitated iron carbonate, filtering the solution, concentrating and crystallizing.

Soluble in about 4 parts of water at 25°C. (77°F.), and in 2 parts of boiling water; insoluble in alcohol.

Uses. This salt is considerably used for dyeing, and as a test for ferric salts, with which it forms a blue color (Ferrocyanide of Iron). Average dose.—0.500 Gm.=500 milligrammes (7½ grains).

POTASSII HYDROXIDUM. U. S. Potassium Hydroxide.

Potassa. Potassium Hydrate.

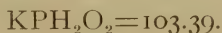


“It should contain not less than 85 percent. of pure anhydrous Potassium Hydroxide, and not more than 2 percent. of other inorganic substances, with the exception of water. It should be kept in well-stoppered bottles made of hard glass.” < U. S.

This is known commercially as “Caustic Potash” and, as found in the market, contains a variable quantity of potassium hydroxide. Manufacturers and large users usually buy it upon assay as to the percentage of anhydrous potassium hydroxide it contains. For chemical and pharmaceutical use it is generally made up into sticks and kept in glass bottles. It is also made into smaller pencils and cones for surgical use. It rapidly destroys organic tissue and great care must be used in handling it. When exposed to the air it absorbs moisture and deliquesces, and it also absorbs carbon dioxide and is converted into potassium carbonate.

It is soluble in about 0.4 part of water and in 2 parts of alcohol at 25°C. (77°F.), and is very soluble in boiling water or alcohol.

Uses. It is the positive base of a great number of chemical combinations with acids and negative bases, and is extensively used in the manufacture of chemical potassium salts. In medicine it is a powerful escharotic, acting quickly upon living tissue. Largely diluted its solution is given as an antacid and neutralizer of acid secretions. Average dose, see *Liquor Potassii Hydroxidi*.

POTASSII HYPOPHOSPHIS. U. S. Potassium Hypophosphite.

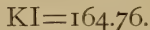
"It should contain not less than 98 percent. of pure Potassium Hypophosphite [$\text{PO}\cdot\text{H}_2\text{OK}$], and should be kept in well-stoppered bottles. Caution should be observed in dispensing Potassium Hypophosphite, as explosion is liable to occur when it is triturated or heated with nitrates, chlorates, or other oxidizing agents." <U. S.

This salt may be prepared by boiling a solution of potassa and phosphorus together, then treating with carbon dioxide gas to neutralize the excess of potassa, evaporating to dryness, dissolving out the potassium hypophosphite with alcohol, and evaporating to a granular powder. It may also be made by the double decomposition between calcium hypophosphite and potassium carbonate in solution.

This salt is very deliquescent. It is soluble in 0.5 part of water, and in 7 parts of alcohol at 25°C . (77°F).

Uses. It is chiefly used combined with other hypophosphites in solutions and syrups.

Average dose.—0.500 Gm.=500 milligrammes ($7\frac{1}{2}$ grains).

POTASSII IODIDUM. U. S., Br. Potassium Iodide.

"It should contain not less than 99 percent. of pure Potassium Iodide, and should be kept in well-stoppered bottles." <U. S.

"Potassium Iodide, KI, may be prepared in the same manner as potassium bromide, iodine being used in place of bromine." <Br.

For convenience a formula corresponding to the Br. P. formula is given.

Solution of Potash, Br., (Imperial measure),	1 gallon
Iodine, a sufficiency, about	21 ounces av.
Wood Charcoal, in fine powder,	3 ounces av.
Boiling Distilled Water, a sufficiency.	

Put the solution of potash into a glass or porcelain vessel and add iodine in small quantities at a time, with constant agitation, until the solution acquires a permanent brown tint. Evaporate the whole to dryness in a porcelain dish, pulverize the residue and mix it intimately with the charcoal, throw the mixture, a small quantity at a time, into a red-hot crucible and when all has been brought to a state of fusion, pour out the contents. When cooled dissolve it in 2 pints of boiling water, filter the liquid through paper, add a little boiling distilled water through the filter, evaporate the liquid until a film forms on the surface, and set aside to crystallize, drain and dry the crystals in a warm, place.

In a commercial way other methods are employed which are more economical.

In moist air this salt is slightly deliquescent. It is soluble in 0.7 part of water and in about 12 parts of alcohol at 25°C. (77°F.), also in 2.5 parts of glycerin. It is incompatible with cinchona alkaloids and their salts.

Uses. Potassium iodide is one of the most valuable of the medicinal salts. It is employed as the source of other iodides by double decomposition, and in medicine as an alterative and absorbent in scrofula, syphilis, rheumatism, dropsy etc., and externally in lotions, ointments and other forms. The dose of this salt is from 2 to 20 grains, or much more in solution.

Average dose.—0.500 Gm.=500 milligrammes (7½ grains).

POTASSII NITRAS. U. S., Br. Potassium Nitrate.

Sal Nitre. Nitre. [Saltpetre].



“It should contain not less than 99 percent. of pure Potassium Nitrate [$\text{NO}_2\cdot\text{OK}$], and should be kept in well-stoppered bottles.”
<U. S.

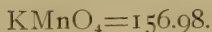
“Potassium Nitrate, KNO_3 , may be obtained by purifying crude nitre, or by the interaction of sodium nitrate and potassium chloride.”
<Br.

This salt is obtained in some parts of the world as a natural product, but is chiefly made by the process of nitrification. Earth, wood-ashes, animal and vegetable refuse, sewage etc., are mixed together in what are called “nitre beds,” and by the action of the ferment which causes nitrification, potassium nitrate is produced. It is now a well established fact that nitre is the product of living organisms acting on appropriate materials. The mixed soils etc., of the nitre beds, after standing for a long time, are lixiviated with water, and the crude nitre which is obtained by evaporating the liquid, is purified and crystallized, in which form it appears on the market.

It is soluble in 3.6 parts of water at 25°C. (77°F.), and in 0.4 part of boiling water; but slightly soluble in alcohol. When heated to 353°C. (667.4°F.), it melts, and may be cast into balls known as **sal prunelle**.

Uses. In the arts nitre is used extensively as an ingredient of gunpowder and pyrotechnics. In medicine it is used as a diuretic and diaphoretic in doses of 5 to 20 grains, and is also used externally in solution. It is used in powder as an ingredient of condition powders, and a solution is used for saturating paper upon which, when dry, asthma powders are burned. It is also an ingredient of pastilles.

Average dose.—0.500 Gm.=500 milligrammes (7½ grains).

POTASSII PERMANGANAS. U. S., Br. Potassium Permanganate.

"It should contain not less than 99 percent. of pure Potassium Permanganate [$\text{MnO}_3\cdot\text{OK}$], and should be kept in glass-stoppered bottles, protected from light."

"Potassium Permanganate, when in concentrated solution or in the dry condition, should not be brought in contact with organic or other readily oxidizable substances." <U, S.

"Potassium Permanganate, $\text{K}_2\text{Mn}_2\text{O}_8$, may be obtained by the interaction of potassium chlorate, potassium hydroxide and manganese dioxide." <Br.

The U. S. and Br. give no process for making this salt, but the 1885 Br. P. directed:

Caustic Potash,	5 ounces av.
Black Oxide of Manganese,	4 ounces av.
Chlorate of Potassium,	3½ ounces av.
Distilled Water,	43 fl.ounces
Carbonic Acid, a sufficiency.	

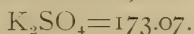
Reduce the potassium chlorate to a fine powder and mix it with the manganese oxide; put the mixture in a porcelain basin and add to it the caustic potash previously dissolved in 4 fl.ounces of water; evaporate to dryness on a sand-bath, stirring well to prevent spurting. Powder the product and place the powder in a covered crucible, exposing it to a dull-red heat for an hour, or until it has assumed a semi-fluid condition. Let cool, powder it, and boil with 30 fl.ounces of water, let the insoluble matter decant, pour off the liquid, boil the sediment again with 10 fl.ounces of water, pour off the liquid and add that to the portion previously reserved, saturate with carbonic acid gas and evaporate until a pellicle forms on the surface, then set aside to cool and crystallize; drain the crystalline mass, boil it in 6 ounces of water, strain through a little asbestos in a funnel, again crystallize, drain the crystals and dry them under a bell jar over a vessel containing sulphuric acid.

This salt should be kept in glass-stoppered bottles protected from the light, and should not be brought in contact with organic or readily oxidizable substances.

It is soluble in about 15 parts of water at 25°C. (77°F.), and in 3 parts of boiling water. It is decomposed by alcohol. When heated to 240°C. (464°F.) it is decomposed with evolution of oxygen. It is usually prescribed internally in the form of pills, and externally its solution is a valuable antiseptic.

Uses. It is used as an antiseptic, disinfectant and oxidizing agent. It is given internally in small doses in solution and applied externally to putrescent or gangrenous wounds, sores, ulcers etc.

Average dose.—0.065 Gm.—65 milligrammes (1 grain).

POTASSII SULPHAS. U. S., Br. Potassium Sulphate.

"It should contain not less than 99 percent. of pure Potassium Sulphate [$SO_2(OK)_2$]." < U. S.

"Potassium Sulphate, K_2SO_4 , may be obtained by purifying the crude salt, or by the interaction of sulphuric acid and potassium chloride or certain other potassium salts." < Br.

Sulphate of potassium is produced as a by-product of the manufacture of several other more important salts. It may be made by decomposing potassium nitrate or chloride with sulphuric acid.

Soluble in about 9 parts of water at $25^\circ C.$ ($77^\circ F.$), and in 4 parts of boiling water; insoluble in alcohol.

Uses. In chemistry this is employed as the basis of several of the potassium compounds, acting by interaction in solution. In pharmacy it has been mainly used in making powder of ipecac and opium, in which it acts as a dilutant.

Average dose.—2 Gm. (30 grains).

POTASSII TARTRAS. Br.

Potassium Tartrate, Normal. Neutral Potassium Tartrate.



"Normal Potassium Tartrate, $(CHOH)_2(COOK)_2 \cdot H_2O$, is obtained by neutralizing acid potassium tartrate with potassium carbonate." < Br.

The 1885 Br. P. gave the following formula:

Acid Tartrate of Potassium,

(Cream of Tartar),

20 ounces, or a sufficiency

Carbonate of Potassium,

9 ounces, or a sufficiency

Boiling Distilled Water,

50 ounces, or a sufficiency

Dissolve the carbonate of potassium in the water, add the cream of tartar, a little at a time, and, if after a few minutes' boiling, the liquid is not neutral to test paper, make it so by the careful addition of more of the carbonate or cream of tartar; then filter, evaporate until a pellicle forms and set aside to crystallize. This is known as neutral potassium tartrate, and cream of tartar is known as acid potassium tartrate.

Uses. It is used in making Fehling's Solution, and also as a laxative in small doses and as a purgative in doses of 30 to 240 grains.

POTASSII TARTRAS ACIDUS. Br.

Acid Potassium Tartrate. Purified Cream of Tartar.

Bitartrate of Potassium.

"Acid Potassium Tartrate, $(CHOH)_2COOH \cdot COOK$, is obtained from the crude cream of tartar which is deposited during fermentation of grape juice, and from the lees of wine." < Br. See Potassii Bitartras. Dose, 20 to 60 grains.

Other Potassium Salts.

The foregoing official salts of potassium are all that are used to any extent in pharmacy and medicine, but a number of others are prepared and sometimes called for, the more important being noticed under the heading Potassium, in the Chemical Section, Part I.

PROPYL OR TRITYL.

The hypothetical radical of which propylic alcohol, $\text{C}_3\text{H}_7\text{OH}$, is the hydrate, is known as Propyl or Trityl. Propylic alcohol is a fusel oil obtained from the fermented residuum of expressed grapes after the marc-brandy has passed over. It is also called fusel oil of marc-brandy.

It combines with ammonia, forming Propylamine; with phenol, forming Phenol-propyl-alcohols etc.

PULVERES — POWDERS.

Aside from the general meaning of the word powder or powders, as describing any finely comminuted substance, the term is applied in U. S. and Br. pharmacy to a class of compound powders which have been adopted as convenient or efficient preparations to be dispensed in this form. Other powders, as tooth powders, toilet powders etc., will be found under their proper headings, only the official compound powders, intended to be used as medicine, being included here.

PULVIS ACETANILIDI COMPOSITUS. U. S.**Compound Acetanilide Powder.**

Acetanilide,	70 Gm. or 7 ounces
Caffeine,	10 Gm. or 1 ounce
Sodium Bicarbonate,	20 Gm. or 2 ounces
To make	100 Gm. or 10 ounces

The ingredients are separately to be reduced to a fine powder and mixed thoroughly.

Average dose.—0.500 Gm.=500 milligrammes ($7\frac{1}{2}$ grains).

PULVIS AMYGDALÆ COMPOSITUS. Br.**Compound Powder of Almonds.**

Sweet Almonds,	8 ounces or 200 Gm.
Refined Sugar,	4 ounces or 100 Gm.
Gum Acacia,	1 ounce or 25 Gm.

Blanch the almonds, dry them thoroughly and powder, then mix with the gum and sugar. This is used for making mixture of almond.

PULVIS ANTIMONIALIS. Br.**Antimonial Powder. James' Powder.**

Oxide of Antimony,	25 Gm. or 1 ounce
Precipitated Calcium Phosphate,	50 Gm. or 2 ounces
Mix them intimately. Dose, 3 to 6 grains.	

PULVIS AROMATICUS. U. S. Aromatic Powder.

Cinnamon, No. 60 powder,	35 Gm. or 7 drachms
Ginger, No. 60 powder,	35 Gm. or 7 drachms
Cardamom, No. 60 powder,	15 Gm. or 3 drachms
Nutmeg, No. 60 powder,	15 Gm. or 3 drachms

Mix them intimately.

Under the title **Pulvis Cinnamomi Compositus**, Compound Powder of Cinnamon, the Br. P. directs cinnamon, cardamom seeds and ginger, each in fine powder, 1 ounce (or 25 Gm.).

Aromatic powder is used for making several preparations, and as an addition to other powders. Average dose.—1 Gm. (15 grains).

PULVIS CATECHU COMPOSITUS. Br.**Compound Powder of Catechu.**

Catechu, in powder,	4 ounces or 100 Gm.
Kino, in powder,	2 ounces or 50 Gm.
Rhatany, in powder,	2 ounces or 50 Gm.
Cinnamon, in powder,	1 ounce or 25 Gm.
Nutmeg, in powder,	1 ounce or 25 Gm.

Mix them thoroughly, pass the powder through a fine sieve and rub it lightly in a mortar. Dose, 10 to 40 grains as an astringent.

PULVIS CINNAMOMI COMPOSITUS. Br.**Compound Powder of Cinnamon. Pulvis Aromaticus.**

Cinnamon Bark, in powder,	1 ounce or 25 Gm.
Cardamom Seeds, in powder,	1 ounce or 25 Gm.
Ginger, in powder,	1 ounce or 25 Gm.

Mix. Dose, 10 to 40 grains.

This corresponds with the U. S. **Pulvis Aromaticus**, which see.

PULVIS CRETÆ AROMATICUS. Br.**Aromatic Powder of Chalk.**

Cinnamon Bark, in powder,	4 ounces or 80 Gm.
Nutmeg, in powder,	3 ounces or 60 Gm.
Cloves, in powder,	1½ ounces or 30 Gm.
Cardamom Seeds, in powder,	1 ounce or 20 Gm.
Refined Sugar, in powder,	25 ounces or 500 Gm.
Prepared Chalk,	11 ounces or 220 Gm.

Mix. Dose, 10 to 60 grains.

PULVIS CRETÆ AROMATICUS CUM OPIO. Br.**Aromatic Powder of Chalk and Opium.**

Aromatic Powder of Chalk, Br.,	9¾ ounces or 39 Gm.
Opium, in powder,	¼ ounce or 1 Gm.

Mix them thoroughly, pass the powder through a fine sieve and finally rub it lightly in a mortar. The dose is 10 to 40 grains, for looseness of the bowels. This powder contains 2½ percent. of opium.

PULVIS CRETÆ COMPOSITUS. U. S.**Compound Chalk Powder.**

Prepared Chalk,	30 Gm. or 3 ounces
Acacia, in fine powder,	20 Gm. or 2 ounces
Sugar, in fine powder,	50 Gm. or 5 ounces

Mix them intimately.

This powder is used for making chalk mixture and is given in powder for summer complaints and teething, in doses of 10 to 60 grains.

Average dose.—2 Gm. (30 grains).

PULVIS EFFERVESCENS COMPOSITUS. U. S.**Seidlitz Powders. Compound Effervescing Powder.**

Sodium Bicarbonate,	31 Gm. or 480 grains
Potassium and Sodium Tartrate,	93 Gm. or 1440 grains

Mix them intimately together and divide into 12 powders, which are to be put up in blue papers.

Tartaric Acid, in fine powder, 27 Gm. or 420 grains

Divide into 12 powders, which are to be put up in white papers.

When taken the contents of one of the blue papers is to be dissolved in about 1½ ounces of water, and the contents of one white paper in about 1 ounce of water. The solutions are then to be mixed and immediately drunk during effervescence.

Seidlitz powder measures made of boxwood may be had by which a sufficient quantity of the mixture is taken for each powder.

Seidlitz Mixture is prepared with 1 part of sodium bicarbonate and 3 parts of potassium tartrate (Rochelle Salt) intimately mixed.

PULVIS ELATERINI COMPOSITUS. Br.**Compound Powder of Elaterin.**

Elaterin,	5 grains or 1 Gm.
Sugar of Milk,	195 grains or 39 Gm.

Rub them together in a mortar until they are reduced to a fine powder and intimately mixed. Dose, ½ to 5 grains.

This contains only 2½ percent. of elaterin. The U. S. trituration of elaterin contains 10 percent.

Other triturations are sometimes included among the powders.

PULVIS GLYCYRRHIZÆ COMPOSITUS. U. S., Br.**Compound Powder of Glycyrrhiza, (U. S.), or Liquorice, (Br.).**

The U. S. formula is:

Senna, in powder,	180 Gm. or 2¼ ounces
Licorice Root, in powder,	236 Gm. or 3 ounces
Washed Sulphur,	80 Gm. or 1 ounce
Oil of Fennel,	4 Gm. or 12 minims
Sugar, in fine powder,	500 Gm. or 6¼ ounces

The oil of fennel is to be thoroughly mixed with about one-half the sugar, the remainder of the sugar added and then the other powders, all to be thoroughly mixed and passed through a No. 60 sieve.

This is extensively used as a mild laxative, the dose being from 60 to 120 grains, mixed with hot water and taken as a draught.

Average dose.—4 Gm. (60 grains).

PULVIS IPECACUANHÆ ET OPII. U. S.

Pulvis Ipecacuanhæ Compositus. Br. Dover's Powder.

Powder of Ipecac and Opium. Compound Powder of Ipecacuanha.

The U. S. formula is:

Ipecac, in powder,	10 Gm. or 1 ounce
Opium, in powder,	10 Gm. or 1 ounce
Sugar of Milk, in No. 30 powder,	80 Gm. or 8 ounces

Rub them together to a very fine powder.

This powder is extensively used as a sudorific, the dose being from 5 to 15 grains.

Average dose.—0.500 Gm.=500 milligrammes ($7\frac{1}{2}$ grains).

The Br. P. formula is:

Ipecacuanha Root, in powder,	$\frac{1}{2}$ ounce or 10 Gm.
Opium, in powder,	$\frac{1}{2}$ ounce or 10 Gm.
Potassium Sulphate, in powder,	4 ounces or 80 Gm.

Mix. Dose, 5 to 15 grains. This powder contains 10 percent. of opium. <Br.

PULVIS JALAPÆ COMPOSITUS. U. S., Br.

Compound Powder of Jalap.

The U. S. formula is:

Jalap, in powder,	35 Gm. or $3\frac{1}{2}$ ounces
Potassium Bitartrate, in fine powder,	65 Gm. or $6\frac{1}{2}$ ounces

Rub them together until they are thoroughly mixed.

Average dose.—2 Gm. (30 grains).

The Br. formula is jalap, in powder, 5 ounces (or 100 Gm.), acid tartrate of potassium (cream of tartar) 9 ounces (or 180 Gm.), ginger, in fine powder, 1 ounce (or 20 Gm.). Mix.

The dose of this powder is 20 to 60 grains, usually given in syrup.

PULVIS KINO COMPOSITUS. Br.

Compound Powder of Kino.

Kino, in powder,	$3\frac{3}{4}$ ounces or 75 Gm.
Opium, in powder,	$\frac{1}{4}$ ounce or 5 Gm.
Cinnamon, in powder,	1 ounce or 20 Gm.

Mix them intimately. The dose is 5 to 20 grains for looseness of the bowels etc.

This powder contains 5 percent. of opium.

PULVIS MORPHINÆ COMPOSITUS. U. S.**Compound Powder of Morphine. [Tully's Powder].**

This preparation was introduced by Dr. Tully, and has been quite popular with physicians as a substitute for Dover's Powder.

Morphine Sulphate,	1.5 Gm. or 23 grains
Camphor,	32.0 Gm. or 494 grains
Glycyrrhiza, in No. 80 powder,	33.0 Gm. or 509 grains
Precipitated Calcium Carbonate,	33.5 Gm. or 517 grains
Alcohol, a sufficient quantity	

To make 100 Gm. or 1543 grains

The morphine sulphate is to be rubbed in a mortar with the precipitated calcium carbonate, added in portions of about 5 Gm. (or 77 grains) each, until it is thoroughly mixed. The camphor rubbed with enough alcohol to reduce it to a powder, is then to be added to the mixture and mixed intimately with it and the glycyrrhiza. Finally the powder is to be passed through a No. 40 sieve, and the residue, if any, should be left on the sieve, added to the sifted powder and mixed thoroughly. It is then to be transferred to well-stoppered bottles.
<U. S.

Average dose.—0.500 Gm.=500 milligrammes (7½ grains).

Another form of Tully's Powder is made with opium 60 grains, camphor, licorice and precipitated chalk, each, 180 grains, powdered and thoroughly mixed.

PULVIS OPII COMPOSITUS. Br.**Compound Powder of Opium.**

Opium, in powder,	1½ ounces or 30 Gm.
Black Pepper, in powder,	2 ounces or 40 Gm.
Ginger, in powder,	5 ounces or 100 Gm.
Caraway Fruit, in powder,	6 ounces or 120 Gm.
Tragacanth, in powder,	½ ounce or 10 Gm.

Mix them thoroughly. The dose is 2 to 10 grains for bowel trouble etc. This powder is used for making confection of opium. It contains 10 percent. of opium.

PULVIS RHEI COMPOSITUS. U. S., Br.**Compound Powder of Rhubarb. Gregory's Powder.**

The U. S. formula is:

Rhubarb, in powder,	25 Gm. or 2½ ounces
Magnesia, calcined,	65 Gm. or 6½ ounces
Ginger, in powder,	10 Gm. or 1 ounce

Rub them thoroughly together.

Average dose.—2 Gm. (30 grains).

The Br. formula is:

Rhubarb,	50 Gm. or 2 ounces
Light Magnesia,	150 Gm. or 6 ounces
Ginger,	25 Gm. or 1 ounce

If a less bulky powder is desired heavy magnesia may be used instead of light.

The dose of this powder is from 20 to 60 grains as a laxative and antacid stomachic.

PULVIS SALICYLICUS CUM TALCO. P. G.

Salicylatrenpulver. Powder of Salicylic Acid and Talc.

Salicylic Acid,	3 parts
Wheat Starch,	10 parts
Talc,	87 parts

Mix them thoroughly. This powder is used as a dusting for chapped or inflamed surfaces, or as a Baby powder.

PULVIS SCAMMONII COMPOSITUS. Br.

Compound Powder of Scammony.

Scammony Resin, in powder,	100 Gm. or 4 ounces
Jalap, in powder,	75 Gm. or 3 ounces
Ginger, in powder,	25 Gm. or 3 ounces

Mix them thoroughly. This is used as a cathartic in doses of 10 to 20 grains.

PULVIS SODÆ TARTARATÆ EFFERVESCENS. Br.

Effervescent Tartarated Soda Powder. Seidlitz Powders.

Sodium Potassium Tartrate, dry powder,	120 grains or 7.77 Gm.
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Sodium Bicarbonate, dry powder,	40 grains or 2.59 Gm.
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Mix them for one blue powder.

Tartaric Acid,	38 grains or 2.46 Gm.
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For one white powder.

See also Pulvis Effervescens Compositus.

PULVIS TRAGACANTHÆ COMPOSITUS. Br.

Compound Powder of Tragacanth.

Tragacanth, in powder,	25 Gm. or 1 ounce
Gum Acacia, in powder,	25 Gm. or 1 ounce
Starch, in powder,	25 Gm. or 1 ounce
Refined Sugar, in powder,	75 Gm. or 3 ounces

Rub them well together. Dose, 20 to 60 grains.

PYRAMIDON.

This is, chemically, dimethyl-amido phenyl-dimethyl pyrazolon. $C_{13}H_{17}N_3O$. A complex chemical compound similar to phenacetine.

An anodyne, analgesic and antipyretic, recommended for hectic fever. Dose 4 to 10 grains. It may be given in powder or in solution.

Pyramidon Camphorate, Neutral, is a mixture of pyramidon 69 percent. with camphoric acid 31 percent.

Pyramidon Camphorate, Acid, has 47 percent. of pyramidon with 32 percent. camphoric acid.

Pyramidon Salicylate is used in neuralgia and rheumatism.

PYRIDINA. Pyridine.



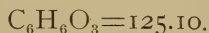
This is a liquid alkaloid formerly obtained from Dipple's Animal Oil or bone-oil, which is produced by the distillation of bones and other animal matter; but is now obtained from coal-tar naphtha or peat-tar. It is the first member of the pyridine series and, consequently is the basis of many important compounds that have recently been introduced. It has been suggested by a distinguished scientist that all alkaloids have been built up by derivation from pyridine hydrides. It is a colorless liquid of strong odor, sp. gr. 0.9858 at 0°C., and boils at 115°C. It has been used, largely diluted, in atomizers for asthma and may be given internally in doses of 3 drops.

Pyridine Tannate. This is a compound of pyridine with tannin, in the form of a white powder, recommended as a solvent for uric acid and as an intestinal astringent. It may also be used externally as a wound antiseptic.

PYRODINE. Hydrazetin.

This is a white, odorless, crystalline compound, chiefly acetyl phenyl hydrazin. It is a powerful antipyretic and antirheumatic, soluble in 50 parts of water, and may be given in ½ to 1 grain dose. It is also used in the form of an ointment for obstinate skin diseases.

PYROGALLOL. U. S. Pyrogallic Acid.



"A triatomic phenol [$\text{C}_6\text{H}_3(\text{OH})_3$ 1:2:3], obtained chiefly by carefully heating gallic acid. Pyrogallic acid should be kept in dark, amber-colored bottles." <U. S.

Soluble in 1.6 parts of water, 1 part of alcohol, and in 1.1 parts of ether at 25°C. (77°F.).

This may be prepared by heating gallic acid, previously well-dried, on a water-bath at the temperature of boiling water, in a glass retort by means of a zinc-chloride bath to 212°C. (410°F.), at which temperature the pure acid sublimes and may be gathered in a glass receiver. It is chiefly used in dyeing and is an important requisite with the silver nitrate dyes used for dyeing the hair and whiskers. It is some-

what employed in medicine, particularly in the form of ointment for psoriasis, lupus and similar skin affections, also in solution for some forms of rash.

Pyrogallol Monacetate. This is a combination of pyrogallol with acetic acid. Its solution in acetone, containing 66 percent. of the drug, is known as **Eugallol**. It is chiefly marketed in this form, and is used for the same purposes as pyrogallol in psoriasis.

Pyrogallol Diacetate. This is a resinous solid prepared by the action of acetic acid upon pyrogallol. A solution of this in acetone is marketed under the trade name **Saligallol**. It is used as an astringent skin varnish and is compounded with other dermic medicaments.

Pyrogallol Triacetate. A compound of pyrogallic acid with acetic acid used as a substitute for gallic acid and more commonly known as **Lemigallol**. It is non-poisonous and does not stain. Usually used in the form of ointment or paste, 1:10.

Pyrogallol Oxidized. This is more commonly known as **Pyraloxin**. It is prepared by oxidizing pyrogallol, and is used for the same purposes as pyrogallol but does not stain the skin.

PYROXYLINUM. U. S., Br. Pyroxylin. Soluble Gun Cotton.

"A product obtained by the action of nitric and sulphuric acids on cotton, and consisting chiefly of cellulose tetranitrate [$C_{12}H_{16}(ONO_2)_4O_6$]. It should be kept in cartons, protected from the light." <U. S.

This formula was official in the 7th revision of the U. S. P.:

Purified cotton 100 Gm. (or 3 ounces av.+230 grains), nitric acid 1400 Cc. (or 47.24 fl.ounces), sulphuric acid 2200 Cc. (or 74.30 fl.ounces), alcohol, ether and water, each, a sufficient quantity. The acids are to be mixed gradually in a glass or porcelain vessel and when the temperature has fallen to 32°C. (90°F.), the purified cotton is to be added. The cotton is to be placed in the mixture and stirred with a glass rod until it is thoroughly saturated, and then allowed to macerate until, when a sample is taken out and thoroughly washed with a large quantity of water and then with alcohol and pressed, it is found to be soluble in a mixture of 1 volume of alcohol with 3 volumes of ether. The cotton is then to be removed from the acid mixture and washed, first with cold water until the washings no longer have an acid taste, and then with boiling water until the washings cease to redden blue litmus paper. The pyroxylin is then to be drained on filtering paper and dried in small detached pellets, by means of a water-bath, at a temperature not exceeding 60°C. (140°F.). It should be kept loosely packed in tin cans of small capacity, remote from lights or fire. <U. S. 7th revision.

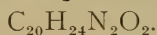
Soluble gun cotton, as thus prepared, is chemically Dinitro Cellulin, and is soluble in a mixture of alcohol and ether, making the Collodion

of pharmacy. It combines with camphor, making Celluloid, which by pressure, is made into a hard flexible substance used for making toilet and other fancy articles, imitating ivory, tortoise shell and other substances by adding coloring to the ingredients. It is extensively manufactured from wood-paper pulp for this purpose.

By varying the strength of the nitric acid used three kinds of gun cotton may be prepared, varying in soluble properties—Mononitro-Cellulin being but slightly explosive and insoluble, Dinitro-Cellulin (the official pyroxylin) being more explosive and soluble in a mixture of alcohol and ether, and Trinitro-Cellulin, which is made with the strongest acids, being very explosive but insoluble. This is the gun cotton chiefly used in mining operations.

Photoxylin. Similar to gun cotton, but prepared from wood instead of cotton. It is soluble in a mixture of equal parts of alcohol and ether and forms a collodion, leaving a much stronger film than gun cotton. It is used in plastic surgery.

QUINIDINA. Quinidine. Quinidia.



This alkaloid may be obtained by decomposing its sulphate (which is recovered from the mother liquors after the crystallization of quinine sulphate) with ammonia water or other alkaline solution, washing the precipitate on a filter and drying. The alkaloid is seldom used except for making elixirs. It is isomeric with quinine.

QUINIDINÆ SULPHAS. Quinidine Sulphate.

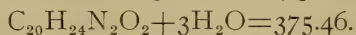


This salt is obtained from the mother liquors from which sulphate of quinine has been removed by crystallization. It differs from quinine sulphate by being much more soluble, containing a smaller percentage of water, and by being dextrogyre while quinine is lævogyre. It is sometimes called "dextro-quinine."

Medicinally, it is equal to quinine as an antiperiodic and antipyretic, but not as a tonic. The dose is from 1 to 20 grains.

It was official in the 7th revision of the U. S. P.

QUININA. Quinine. (Quinia).



"An alkaloid obtained from the bark of various species of Cinchona (Fam. Rubiaceæ). Quinine should be kept in well-stoppered, amber-colored bottles." < U. S.

The alkaloid quinine is but little used in medicine on account of its insolubility as compared with its salts. In pharmacy it is frequently directed for making preparations in which the salts are objectionable, as some of the elixirs, syrups etc., and for making oleate of quinine.

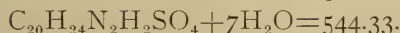
It may readily be prepared from the sulphate or other salts of quinine by adding to their acid solution ammonia water or other alkaline solution just sufficient to decompose the salt and precipitate the alkaloid. The precipitate is then washed on a filter with cold water and carefully dried.

It is soluble in 1750 parts of water, 0.6 part of alcohol, 4.5 parts of ether at 25°C. (77°F.).

Uses. Quinine and its salts are tonic, antiperiodic and antipyretic. The dose of the alkaloid and most of its salts is from 1 to 20 grains, according to circumstances. It is needless to remark that preparations of quinine are the most valuable and the most generally used of any medicines. The alkaloid is seldom prescribed, its more soluble salts being generally directed in prescriptions.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

QUININÆ BISULPHAS. U. S. Quinine Bisulphate.



"The acid sulphate $[\text{SO}_2(\text{OH})_2 \cdot \text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2 + 7\text{H}_2\text{O}]$ of the alkaloid quinine. It should be kept in well-stoppered, dark amber-colored vials." <U. S.

This salt may be prepared by adding to quinine sulphate mixed with eight times its weight of water, sufficient sulphuric acid to dissolve it; concentrating the solution by evaporation and allowing to crystallize; then draining and drying the crystals on bibulous paper.

Soluble in 8.5 parts of water, 18 parts of alcohol at 25°C. (77°F.).

It is much more soluble and contains about one-eighth less of the alkaloid than quinine sulphate, but otherwise it does not differ from it in general use, properties and dose.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

QUININÆ HYDROBROMIDUM. U. S. Quinine Hydrobromide.

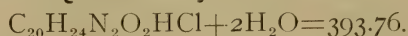


"The hydrobromide $[\text{HBr} \cdot \text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2 + \text{H}_2\text{O}]$ of the alkaloid quinine. It should be kept in well-stoppered, amber-colored vials." <U. S.

This may be most readily made by decomposing 40 parts of quinine sulphate dissolved in 10 times its weight of hot alcohol, with 11 parts of potassium bromide dissolved in 3 times its weight of water. The sulphuric acid combined with the quinine unites with the potassium, forming potassium sulphate, which crystallizes and the bromine unites with the quinine in the remaining solution, which is concentrated until crystals of quinine hydrobromate are formed. It is soluble in 40 parts of water, 0.67 part of alcohol, 16 parts of ether, and 3 parts of glycerin at 25°C. (77°F.).

The uses and doses are similar to those of other quinine salts.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

QUININÆ HYDROCHLORIDUM. U. S., Br.**Quinine Hydrochloride.**

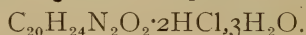
"The hydrochloride [$\text{HCl} \cdot \text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2 + 2\text{H}_2\text{O}$] of the alkaloid quinine. It should be kept in well-stoppered, amber-colored vials." < U. S.

"The hydrochloride, $\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2\text{HCl} \cdot 2\text{H}_2\text{O}$, of an alkaloid obtained from the bark of various species of *Cinchona* and *Remijia*." < Br.

This may be made in the same manner as quinine sulphate, using hydrochloric acid instead of sulphuric acid, or by decomposing quinine sulphate with barium chloride in the same manner as is directed for preparing quinine hydrobromate; or by dissolving the alkaloid quinine with diluted hydrochloric acid, concentrating the solution and crystallizing. It is soluble in 18 parts of water, 0.6 part of alcohol, 0.8 part of chloroform and in 8 parts of glycerin at 25°C. (77°F.).

The uses and dose are similar to those of quinine sulphate, but it is much more soluble, making it more desirable for many purposes.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

QUININÆ HYDROCHLORIDUM ACIDUM. Br.**Acid Quinine Hydrochloride.**

"The acid hydrochloride of an alkaloid obtained from the bark of various species of *Cinchona* and *Remijia*." < Br.

This may be prepared by adding to quinine hydrochloride mixed with 8 times its weight of water sufficient hydrochloric acid to dissolve it; then concentrating the solution by evaporation, allowing to crystallize and then draining and drying the crystals. This is the most soluble salt of quinine, being soluble in less its own weight of water. Dose, 1 to 10 grains.

QUININÆ SALICYLAS. U. S. Quinine Salicylate.

"The salicylate [$2\text{C}_6\text{H}_4(\text{OH})\text{COOH} \cdot \text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2 + \text{H}_2\text{O}$] of the alkaloid quinine. It should be kept in amber-colored, well-stoppered vials." < U. S.

This salt of quinine may be prepared by neutralizing a hot solution of salicylic acid with the alkaloid quinine, and allowing it to crystallize. It is soluble in 77 parts of water, 11 parts of alcohol and in 16 parts of glycerin at 25°C. (77°F.).

It may be advantageously used in neuralgia and rheumatism accompanied by neuralgic pain. It is decomposed in the intestines and the action of each of its constituents becomes effective.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

QUININÆ SULPHAS. U. S., Br. Quinine Sulphate.

"The sulphate $[(\text{SO}_2\text{OH})_2 \cdot (\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2)_2 + 7\text{H}_2\text{O}]$ of the alkaloid quinine. It should be kept in well-stoppered bottles, preferably of amber color, and in a dark place." <U. S.

"The sulphate $[(\text{C}_{20}\text{H}_{24}(\text{N}_2\text{O}_2, \text{H}_2\text{SO}_4)_2, 15\text{H}_2\text{O}]$, of an alkaloid obtained from the bark of various species of *Cinchona* and *Remijia*." <Br.

This is the best known and most extensively used of any of the salts of quinine. It is popularly known and called for as "quinine," and may generally be dispensed when quinine is called for. It is less desirable in many respects than the hydrochloride or bisulphate of quinine, but has the advantage of being well known, and therefore stands at the head of the quinine salts.

It is made from cinchona bark on a large scale by the manufacturers of chemicals in this country and in Europe, and forms a very important article of commerce.

Manufacturing chemists who prepare it have, each, their special processes which produce it. The products vary slightly in general appearance; but medicinally and chemically they are the same.

Quinine sulphate is soluble in 720 parts of water, 86 parts of alcohol, 400 parts of chloroform, and in 36 parts of glycerin at 25°C. (77°F.). It is precipitated by soluble alkalies but redissolves in excess of alkali.

Uses. Quinine sulphate is a tonic, antiperiodic and antipyretic; its uses are too well known to require further mention.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

Other Salts of Quinine.

The foregoing are the salts of quinine official in the U. S. P. and Br. P., but many other salts are made and sold by manufacturing chemists; they are, however, but little used, and the processes for making are not different from those already given; being chiefly made by decomposing a solution of the sulphate, and recombining with the acid desired.

"**Hospital Quinine**" is a mixture of the sulphates of cinchonidine, quinidine and quinine, generally containing about 50 percent. of quinine in combination.

"**Dextro-Quinine**" and "**Cincho-Quinine**" are preparations containing quinidine mixed with cheaper salts of cinchona.

"**Sweet Quinine**," which had at one time a great run, proved to be a mixture of the cheaper salts of cinchona with powdered glycyrrhizin.

Several other preparations claiming to be substitutes for quinine are made up of the cheaper salts of cinchona bark combined with other

substances; but since low prices have ruled for quinine sulphate, there is little demand for them.

A great number of salts and compounds of quinine have been added to the foregoing official list during the past few years, but they are mostly unimportant in medicine and will seldom be employed except by experimental practitioners.

Many of these compounds are known by trade names having quinine or quin-, chinine or chin- as a part of the title.

QUINOLINE. Chinoline.

This liquid alkaloid is fully described under the title *Chinolina*, its European name. In this country it is called *Quinoline* and several compounds are named *Quin-* which in European countries are *Chin-*, as *quinacetin*, *quinalgen* (*analgen*), *quinaphtol*, *quinaseptol*, etc. See page 499.

RADICES — ROOTS.

In botany the root is the descending axis of the plant; in commerce roots are the parts of plants that grow in the ground; but in pharmacy they are separated into classes according to their characteristics, and are designated as root, rhizome, rootlets, bulb, corm and tuber, the root being the part of the descending axis of the plant through which it obtains certain portions of its nourishment.

In the U. S. and some of the European pharmacopœias only the name of the plant from which the root is obtained is given, as *Glycyrrhiza*, but in case the root and some other part are official, the title is followed with the word *Radix* or "root." In the Br. P. the Latin name of the plant is followed by the word "*Radix*" as *Glycyrrhizæ Radix*, and the common title has the name of the plant preceding the word "root," as "*Liquorice root*."

As all of the U. S. and Br. P. Roots are described in the Organic *Materia Medica* part of this work in the alphabetical order of subjects, and those not official are mostly noted, they will not be further considered under this heading.

RESINÆ — RESINS.

Resins, as understood in pharmacy, are substances obtained from vegetable matters, insoluble in water, but soluble in oils, alcohol or ether, and obtained as natural exudates, or as residues by distillation from oleo-resins or turpentine, or by precipitation from alcoholic fluid extracts of drugs in which they naturally exist as active principles.

The following Resins are official in the U. S. and Br. P.

RESINA. U. S., Br. **Rosin.** U. S. **Resin.** Br. **Colophony.**

"The residue left after distilling off the volatile oil from turpentine." < U. S.

"The residue left after the distillation of the oil of turpentine from the crude oleo-resin (turpentine) of various species of *Pinus*." <Br.

A hard, brittle, transparent or translucent substance, from a very pale to a dark amber color. It consists of abietic anhydride, which, when treated with dilute alcohol is converted into abietic acid.

Specific gravity from 1.070 to 1.080, readily fusible, and burns with a dense yellowish smoke, leaving no ash.

Uses. Rosin is extensively used in the industrial arts for various purposes and in pharmacy is employed to impart adhesiveness to ointments, cerates and plasters, and internally in powder is considerably used in veterinary medicines.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

Retinol. A product of the destructive distillation of resin. It is an oily liquid of a yellowish color, and is useful as a solvent of many of the newer remedies, as aristol, iodol etc., many of the alkaloids, carbolic acid, creosote, phosphorus etc.

Rosin Oil is obtained by the dry distillation of rosin. It is used for lubricating etc., being first made into a soap with slaked lime. It is an ingredient of axle-grease.

RESINA COPAIBÆ. Resin of Copaiba.

Official in the 7th but dismissed in the 8th revision of the U. S. P.

The residue left after distilling off the volatile oils from copaiba. It is a yellowish, brittle resin of a weak odor and taste of copaiba, and an acid reaction. It is used to combine with copaiba and oil of cubebs making "Extract of Cubebs and Copaiba," a paste or soft mass used for gonorrhœa.

RESINA JALAPÆ. U. S. Resin of Jalap.

Jalapæ Resina. Br. Jalap Resin.

Jalap, in No. 60 powder, 1000 Gm. or 16 ounces av.

Alcohol,

Water, of each, a sufficient quantity.

Preparation. The powder is to be moistened with 300 Cc. (or 5 fl.ounces) of alcohol, and packed firmly in a cylindrical percolator; enough alcohol is to be poured upon it to saturate the powder and leave a stratum above, and after 48 hours it is to be percolated, gradually, adding alcohol until 2500 Cc. (or 2½ pints) of tincture are obtained. The alcohol is then to be distilled off until the tincture is reduced to 250 Cc. (or 4 ounces), and this residue is to be slowly added, with constant stirring, to 3000 Cc. (or 3 pints) of water. The precipitate is then allowed to subside, the supernatant liquid drawn off, and the precipitate washed twice with fresh portions of water. It is then to be placed upon a strainer, drained and pressed, and the

resin dried with gentle heat, stirring occasionally until the moisture has evaporated. <U. S. The Br. formula is practically the same.

Soluble in all proportions in alcohol, but insoluble in most other media, and not more than 10 percent. soluble in ether. This is used as a cathartic, usually in pills or powder.

Uses. This resin has been extensively used in the past as a purgative and is still employed as an ingredient of the official cathartic pills.

Average dose.—0.125 Gm.=125 milligrammes (2 grains).

RESINA PODOPHYLLI. U. S. Resin of Podophyllum.

Podophylli Resina. Br. Podophyllum Resin.

[Podophyllin].

Podophyllum, No. 60 powder,	1000 Gm. or 1 pound
Hydrochloric Acid,	10 Cc. or 75 minims
Alcohol,	

Water, of each, a sufficient quantity.

Preparation. The powder is to be percolated in the usual manner with alcohol until the drug is exhausted. The alcohol is then to be distilled off until the residue is reduced to a syrupy consistence, and this is to be poured slowly, and with constant stirring, into 1000 Cc. (or 1 pint) of cold water, to which the hydrochloric acid has been previously added. The supernatant liquid is then to be poured off from the precipitate, after it has subsided, and it is to be washed twice with portions of fresh water. The precipitate is then to be spread in a thin layer on a strainer, drained and dried by exposure to air, occasionally breaking up the cake while it is drying and finally powdering it in a mortar. <U. S. The Br. formula is practically the same.

Soluble in alcohol in all proportions and in ether to the extent of 75 percent. It is soluble in boiling water to the extent of 80 percent., but most of it is again deposited on cooling. Not less than 99 percent. of resin should be soluble in alcohol.

Uses. This resin, which has been more commonly known as "podophyllin," is an alterative, chologogue, laxative and cathartic. It was first introduced by the Eclectics but was soon adopted by the Regular practitioners. It is an ingredient in several official pills and is generally used in unofficial laxative and liver pills.

Average dose.—Purgative, 0.015 Gm.=15 milligrammes ($\frac{1}{4}$ grain).
Laxative, 0.005 Gm.=5 milligrammes ($\frac{1}{10}$ grain).

RESINA SCAMMONII. U. S. Resin of Scammony.

Scammoniæ Resina. Br. Scammony Resin.

Scammony, in No. 60 powder,	1000 Gm. or 1 pound
Alcohol,	

Water, of each, a sufficient quantity.

Preparation. The scammony is to be digested with successive portions of boiling alcohol until it is exhausted. The tinctures are then

to be mixed and evaporated to a syrupy consistence by distilling off the alcohol. The residue is then to be added in a thin stream, with constant stirring, to 2500 Cc. (or 2½ pints) of water, and the precipitate which forms washed thoroughly and dried at a gentle heat. <U. S. The Br. formula is practically the same.

Soluble in alcohol in all proportions, also wholly soluble in ether and oil of turpentine. It is also soluble in solutions of the alkalies by the aid of heat.

Uses. Resin of scammony has been much employed in the past as a purgative and is still directed as an ingredient in compound pills and powders of the Br. P. but is, otherwise, now seldom used.

Average dose.—0.200 Gm.=200 milligrammes (3 grains).

GUAIACI RESINA. Br. Guaiacum Resin.

Guaiacum. U. S. Guaiac.

This resin is obtained by various means from *Guaiacum Officinale*, and contains Guaiacic Acid, $C_{12}H_{16}O_6$, and several other similar compounds. By dry distillation an oil is obtained containing Guaiacol, $C_7H_3O_2$; Guaiacene, C_8H_8O , and other compounds.

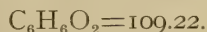
Uses. Guaiac resin is employed in making several preparations, and in medicine it is employed for gout, rheumatism etc., either in solution or in powder. Dose, 5 to 15 grains.

MASTICHE. U. S. Mastic. Gum Mastic.

"A concrete resinous exudation from *Pistacia Lentiscus*, Linné (*Fam. Anacardiaceæ*).>U. S.

It is obtained by incising the bark and collecting the exudate. It occurs in tears, is soluble in alcohol and in oil of turpentine, and is used for making a varnish for pictures and for making cements, also used as a dusting for gilding on leather, cloth etc., for bookbinders' use.

RESORCINOL. U. S. Resorcinol. Resorcin.



"A diatomic phenol [*Metadihydroxybenzene*, $C_6H_4(OH)_2$:3] obtained usually by the reaction of fused sodium hydroxide upon sodium metabenzenedisulphonate. Resorcinol should be kept in dark amber-colored vials.">U. S.

Preparation. This is prepared by converting benzene into benzene-disulphonic acid, neutralizing with milk of lime, decomposing with soda, filtering out the chalk formed and evaporating the filtered liquid to dryness. The product is then fused with caustic soda for 8 or 9 hours, the mixture allowed to cool, then it is dissolved in boiling water, hydrochloric acid added, and the boiling continued until all the sulphurous anhydride has escaped in fumes. The residue is then filtered and shaken frequently during several hours with portions of

ether. The ethereal solution is then evaporated and the residue heated to 275°C. to remove all traces of ether and water. The commercial product thus obtained is purified by distillation. Such is the complicated process of making resorcin.

It is colorless or slightly yellowish, crystalline, with a sweetly pungent taste and a very slight urinous odor. It is soluble in 0.5 part of water at 25°C. (77°F.). Very soluble in alcohol.

Uses. It is extensively used externally and internally as an antiseptic and antipyretic. It is applied like carbolic acid, but is non-toxic and less irritant. It is given internally as a sedative for asthma, and for gastro-intestinal disturbance, cholera morbus etc.

Average dose.—0.125 Gm.=125 milligrammes (2 grains).

Picrol. A resorcinol compound known chemically as potassium diiodoresorcin monosulphonate. A white, odorless powder, soluble in water and glycerin, and containing 52 percent. of iodine. It is an external antiseptic.

Resopyrin. A compound of resorcin and antipyrine in aqueous solution, mixed in molecular proportions. An abundant white precipitate is formed with some included oily drops; on violent agitation the oily mass increases and then solidifies to a hard, white, opaque body, which is resopyrin. Its use is not yet well determined.

Resorcin-Camphor. This is an fluid prepared by melting together equal parts of resorcinol and camphor. It is recommended for pruritus and for parasitic skin diseases.

Resorcin-phtalein. Fluorescein. This is a combination used for coloring tissues, especially for the detection of minute foreign bodies imbedded in the cornea.

RESINOIDS OR CONCENTRATES.

Eclectic Extracts, Powders, or Active Principles.

A class of preparations first introduced by the Eclectics and known as concentrated medicines or resinoids, of which Resin of Podophyllum ("Podophyllin") may be taken as a type, are considerably used; many of them possessing great merit as representing the principles of the drug from which they are derived, in concentrated form. These preparations are, generally, precipitated alcoholic extracts of the drugs, some being resins, some oleo-resins, and others mixed principles, which may or may not represent the true active medicinal value of the drug, depending upon its solubility in alcohol. They must not, therefore, be confounded with true active principles of definite chemical composition bearing the same names, as they sometimes widely differ.

General Formula for Resinoids or Concentrates.

Take of the required drug in moderately fine powder any convenient quantity and alcohol sufficient. Exhaust the drug by water-bath percolation with the alcoholic menstruum and concentrate the percolate by distillation until it is reduced to the consistence of a thin syrup, which pour gradually, and with constant stirring, into a sufficient quantity of cold water. After standing, collect the precipitate, wash it with a little cold water, spread it upon plates, and carefully dry it by

means of a current of warm air, or in the case of oleo-resins, or very soft extracts which are precipitated, mix them with a sufficient quantity of the powdered drug from which they were derived or with sugar of milk or rice flour, to make them into the form of powder.

The consistence of the residue after concentration by distillation or evaporation depends much upon the constituents of the drug, but as a rule, the liquid should be no more than one-fourth the quantity (usually less), of the powdered drug which was taken, and the quantity of cold water into which it is to be poured should be from 10 to 30 times as much as that of the concentrated liquid. Some extracts deposit tarry matter, which is undesirable, and should be removed by allowing them to stand, decanting the clear solution before adding to water. Alum is sometimes added to the water to facilitate the precipitation.

Asclepidin, Cypripedin, Ptelein, Senecin, Xanthoxylin and some other preparations are mostly oleo-resins, and must be mixed with the powdered substance in order to make them into powder. Some, like Leptandrin and Ergotin, are soft resinous substances and are much improved by the addition of a portion of the powdered substance.

As the resinous principles and concentrates, as above described, have mostly been mentioned in Part I. under the names of the plants from which they are obtained it is unnecessary to list them here. They are referred to in the index in alphabetical order.

RHIZOMA—RHIZOME.

This name is given in botany to the subterranean stem from which the real roots extend below, and from which the shoots or leaves extend above. The rhizome is the rootstalk from which the plant puts forth shoots or leaves annually.

The same remarks apply to the use of this term in pharmacy as noted under Radices, which see.

SACCHARA—SUGARS.

Sugars are substances composed of carbon, hydrogen and oxygen, of a sweet taste, crystallizable, and mostly of vegetable origin. The most important sugars are Saccharose, the ordinary sugar of commerce, prepared from sugar-cane, sorghum, beets etc., glucose and milk sugar which have been previously described in this work.

The glucoses have the composition $C_6H_{12}O_6$, and are directly subject to vinous fermentation. The saccharoses have the composition $C_{12}H_{22}O_{11}$, and are fermentable only after being converted into a sugar of the glucose type.

There are also a number of non-fermentable sugars termed Saccharoids, some of them having the same composition as glucose, and others varying somewhat.

Among the other products that are derived from the oxidation of saccharine fluids, alcohol, aldehyde, acetic acid and oxalic acid may be mentioned as most valuable.

SACCHARUM. U. S. Sugar.

Saccharum Purificatum. Br. Refined Sugar. [Syn. Sucrose].



"The refined sugar obtained from *Saccharum officinarum*, Linné; and from various species or varieties of *Sorghum* (Fam. Gramineæ); also from one or more varieties of *Beta vulgaris*, Linné (Fam. Chenopodiaceæ)." <U. S.

"A crystallized sugar, $C_{12}H_{22}O_{11}$, obtained from the juice of the sugar-cane." <Br.

Preparation. The greater part of the sugar found in the market is prepared from the expressed juice of the sugar-cane, grown in the Southern States, the West Indies, the Hawaiian Islands, and Central America, or from beets grown for this purpose in the United States and Germany. The sugar-cane is crushed in mills, and the juice, which is about 80 percent. of the whole, is expressed; a little lime and calcium bisulphide added, then strained and evaporated to a thick syrup, which is placed in casks, allowed to crystallize and drain. In the larger manufacturing establishments the process employed is somewhat different, the vacuum pan being used instead of open evaporation, the draining being accomplished by "centrifugals," which by rapid motion separates the fluid from the solid portions. The process for making sugar from sorghum is the same, and beet-root sugar is made in the same manner, after obtaining the syrup, but the methods of exhaustion are quite different and it is not so readily purified.

The crude or "raw" sugars prepared as described are purified and decolorized by filtering their solutions through powdered animal charcoal, or bone-black. When allowed to crystallize from the solution thus purified the crystals obtained are called rock candy, but if evaporated to a solid mass with continual agitation, it is granulated.

Uses. Granulated sugar, on account of its purity and convenience, is generally chosen for making syrups and liquid preparations, and powdered sugar for making troches, powders, triturations etc. Sometimes cane-sugar is adulterated or mixed with grape sugar, which may be discovered by Trommer's test, which is as follows:

Trommer's Test. To a solution of the sugar or saccharine liquid desired to be tested, add a little solution of copper sulphate and then solution of potassa in excess; heat the mixture to boiling. When cool, if the saccharine solution contained only saccharose or cane-sugar, there will be but a small deposit of red powder; but if it contained grape sugar or glucose, there will be a copious greenish precipitate, which changes to scarlet and afterwards to a dark brownish-red.

SACCHARATUM LACTIS. U. S., Br.**Sugar of Milk. U. S. Milk Sugar. Br. [Syn. Lactose].**

"A peculiar crystalline sugar, obtained from the whey of cow's milk by evaporation, and purified by recrystallization." <U. S.

"A crystalline sugar obtained from the whey of milk." <Br.

Preparation. This may be prepared from the whey which remains in the vats after the curd has been removed, in the process of making cheese, by allowing it to settle, siphoning or draining off the clear liquid and evaporating it to about $\frac{1}{15}$ of its weight, or to the consistence of syrup. This is set aside to crystallize, and after 24 to 48 hours the mother liquor is poured off and the crystals, which form as a bright-yellow, granular mass, are drained, dissolved in boiling water, the solution filtered through animal charcoal until free from color, then concentrated and again crystallized.

Uses. It is very hard and gritty, making it an excellent vehicle for triturates and other preparations in which it is desirable to reduce the medicinal substance to a fine powder and have it thoroughly distributed. It is soluble in 4.78 parts of water at 25°C. (77°F.), and in 1 part of boiling water, insoluble in alcohol, ether or chloroform.

SACCHARINE SUBSTANCES.

The following substances having similar composition and characteristics are known as saccharine substances:

Saccharoses. $\text{C}_{12}\text{H}_{22}\text{O}_{11}$.

Cane-Sugar. (Saccharose). From sugar-cane, beets and sorghum.

Parasaccharose. Produced by spontaneous fermentation of cane-sugar.

Milk Sugar. (Lactose. Lactin). Obtained from milk.

Mycose. Obtained from ergot, identical with trehalose.

Melezitose. Obtained from manna found in Tasmania and Persia.

Melitose. Obtained from various species of eucalyptus.

Trehalose. Obtained from cocoons of *Larinus Maculatus*.

Glucoses. $\text{C}_6\text{H}_{12}\text{O}_6$.

Glucose. (Dextrose or Dextro-Glucose). From starch etc. Rotates the plane of polarization strongly to the right. Also called Corn Syrup.

Grape-Sugar. By crystallizing glucose.

Lævulose. (Lævo-Glucose). From sugar-cane and molasses. Rotates the plane of polarization to the left.

Maltose. (Barley Sugar). By the action of diastase on starch.

Dulcitose. By oxidizing dulcit with nitric acid.

Mannitose. Found in muscular flesh.

Galactose. By treating sugar of milk with dilute sulphuric acid.

Non-Fermentable Sugars.

Mannit. $\text{C}_6\text{H}_{14}\text{O}_6$. From manna and other similar substances.

Dulcit. $\text{C}_6\text{H}_{14}\text{O}_6$. From *melampyrum nemorosum*.

Eucalyn. $\text{C}_6\text{H}_{12}\text{O}_6$. From the fermentation of melitose.

Inosit. $\text{C}_6\text{H}_{12}\text{O}_6$. From muscular flesh.

Quercitrose. $\text{C}_6\text{H}_{12}\text{O}_6$. From quercitrine.

Sorbit. $\text{C}_6\text{H}_{12}\text{O}_6$. From mountain ash berries.

Erythromannit. $\text{C}_{12}\text{H}_{30}\text{O}_{12}$. From *protococcus vulgaris*.

Isodulcit. $\text{C}_6\text{H}_{14}\text{O}_6$. From quercitrine.

Pinit. $\text{C}_6\text{H}_{12}\text{O}_5$. From *pinus lambertiana*.

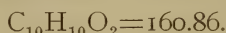
Quercit. $\text{C}_6\text{H}_{12}\text{O}_5$. From acorns.

Saccharates are prepared by saturating sugar with tinctures, drying it, then powdering. Homœopathic pellets are prepared in a similar manner by saturating them with a tincture strongly alcoholic and allowing them to dry.

Oleo-Saccharates—**Eleo-Sacchara**—are prepared by rubbing 1 drop of any volatile oil with 30 grains of powdered sugar until they are thoroughly mixed.

Saccharine. This is prepared by a complicated process from toluene, by treating with acids and ammonia. It is official in the U. S. P. under the title **Benzosulphinidum**, and in the Br. P. under the title **Glusidum**. See these titles.

SAFROLUM. U. S. Safrol.



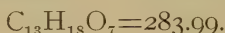
"The methylene ether of allyl pyrocatechol [$\text{C}_6\text{H}_3 \cdot \text{C}_3\text{H}_5 \cdot (\text{OOCH}_2)$ 1:3:4], found in oil of sassafras, camphor oil, and other volatile oils, purified, if necessary, by repeated chilling and crystallization." <U. S.

This is a colorless or faintly yellow liquid having a sassafras-like odor. Sp. gr. 1.105 to 1.106 at 25°C. (77°F.). It is soluble in all proportions with ether and chloroform. In 70 percent. alcohol about 30 percent. is soluble.

It is used for the same purposes as sassafras oil, although it differs from it in flavor. It is chiefly used for flavoring soaps and disinfecting solutions.

Average dose.—0.3 Cc. (5 minims).

SALICINUM. U. S., Br. Salicin.



"A glucoside obtained from several species of *Salix* and *Populus* (Fam. *Salicaceæ*).> <U. S.

"A crystalline glucoside, $\text{C}_6\text{H}_{11}\text{O}_5 \cdot \text{O} \cdot \text{C}_6\text{H}_4 \cdot \text{CH}_2\text{OH}$, obtained from the bark of various species of *Salix* and of *Populus*."> <Br.

A neutral principle prepared from the bark of *Salix* of different species, by treating a boiling concentrated decoction of the bark with lead oxide until it becomes nearly colorless, the lead combining with the gum, tannin and extractive matter which is removed by filtration. The filtered liquid is then treated with sulphuric acid to convert the dissolved lead oxide into a sulphate, and then with barium sulphide to remove sulphates etc. The liquor is then filtered, evaporated and crystallized. Salicin being obtained.

Salicin is a glucoside which yields Saligenin and grape sugar when heated with dilute acids.

Uses. It is used as a febrifuge and tonic in doses of 5 to 30 grains. Some practitioners prefer it to quinine, especially in rheumatic fever.

Average dose.—1 Gm. (15 grains).

SALICYL.



This is a hypothetical compound radical of the salicyl series of compounds. It is not known as a free radical, but only in compounds.

The volatile oil of meadow sweet, *Spiraea Ulmaria*, is a natural hydride of salicyl. Oil of wintergreen and oil of birch are also compounds of salicyl.

Salicylic Acid and its anhydride, salicylous acid, are compounds of the radical salicyl with oxygen and hydrogen. They are fully described under the title *Acidum Salicylicum*, which see.

Salicylous Acid. $C_7H_6O_2$. Salicylol. This is an oily liquid, obtained from volatile oil of meadow sweet, which, when pure, consists entirely of it. It is also obtained from salicin. It is not employed in medicine.

The salicylic acid generally known in commerce is prepared synthetically, and may properly be termed **phenol-salicylic acid**. A salicylic acid may be prepared from oil of wintergreen, and is considerably used, but is much more expensive than the synthetic, and its crystals are much larger and more dense. This is known as **gaulthero-salicylic acid**.

A considerable number of preparations of which the radical salicyl is the basis are used as medicine, most of them being noticed under other headings. The following are trade names of some of the compounds.

Salacetol. Salicyl Acetol. In white, lustrous crystals. An intestinal antiseptic and antirheumatic. Dose 30 to 40 grains.

Salicylamide. An ammonia derivative of salicylic acid. Used as a substitute for salicylic acid. Dose from 3 to 5 grains.

Saliformin. A white salicylate salt recommended as a uric acid solvent and as a urinary antiseptic. Dose 5 to 10 grains.

Salocoll. Phenocoll salicylate. A white, crystalline powder soluble in water. Antiseptic, antirheumatic and antipyretic. Dose 15 to 30 grains.

Salophen. Acetylpara-amidophenol salicylate. In small, white crystalline scales. Antirheumatic and antineuralgic. Dose 10 to 20 grains.

Saloquinine. Quinine ester of salicylic acid. A white, tasteless powder used as an antiperiodic and antineuralgic. Dose 15 to 30 grains. Also known as **Salochinin** and **Rheumatin**.

Salumin. Aluminum salicylate. A reddish-white powder used as an antiseptic, astringent and disinfectant, or may be made into an ointment.

SALOL. Br. Salol.

Phenylis Salicylas. U. S. Phenyl Salicylate.

"The salicylic ester of phenol." < U. S. See Phenylis Salicylas.

"Salol, or phenyl salicylate, $C_6H_4 \cdot OH \cdot COO \cdot C_6H_5$, is prepared by the interaction of salicylic acid and phenol, or of their sodium salts with phosphoryl chloride or carbonyl chloride." < Br.

This is almost insoluble in water; soluble in 10 parts of cold alcohol; very soluble in boiling alcohol, also in ether, chloroform and fixed oils. It melts at 42° to $43^\circ C.$ (107.6° to $109.4^\circ F.$).

Salol is employed as antiseptic and antipyretic, and it is claimed that it possesses all the valuable medicinal properties of salicylic acid without its disagreeable effects. It is given particularly in rheumatic

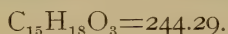
affections accompanied with inflammation or fever, in doses of 5 to 15 grains, and is employed externally as an ingredient of dusting powder or ointment for eruptions, sores etc.

Salol Camphor. Salol 3 parts, camphor 2 parts, when rubbed together in a mortar and heated form a liquid of the consistence of glycerin, which is used as an application for neuralgia, inflamed joints, chilblains etc., also for tooth ache.

SALVERSAN. "606."

This is the trade name for dioxydiamino-arsenobenzol, the new specific for syphilis, introduced by Prof. Ehrlich, of the Royal Institute. It is an arsenical compound of complex composition, used by injection into the gluteal muscles or intravenously, the average dose being 5 grains, in solution, injected once or twice a week. It is a yellow powder, insoluble in water, but is chiefly marketed in solution, in 0.3 Gm. (5 grain) ampules, the contents of one being the required dose. Remarkable results are said to be produced by its use.

SANTONINUM. U. S., Br. Santonin.



"The inner anhydride or lactone of santonic acid, obtained from *Santonica*. It should be kept in dark amber-colored vials and in a dark place." <U. S.

"A crystalline principle, $C_{15}H_{18}O_3$, prepared from *Santonica*, the dried unexpanded flower-heads or capitula of *Artemisia maritima*, var. *Stechmanniana*, Besser." <Br.

No process is now official for making this preparation, which is chiefly made in factories nearby where the plant is grown. It is in colorless, shining, flattened, rhombic prisms; odorless and nearly tasteless. Upon exposure to air and light it becomes yellow. It is soluble in 5300 parts of water, 34 parts of alcohol, 78 parts of ether and 2.5 parts of chloroform at 25°C. (77°F.).

Uses. Santonin is employed in medicine as an anthelmintic in doses of 1 or 2 grains. It is best given in the form of powder or suspended in syrup or emulsion, or in the form of troches. The popular worm confections and lozenges contain santonin.

Average dose.—0.065 Gm.=65 milligrammes (1 grain).

SAPOES — SOAPS.

Soaps are compounds of fatty acids with alkalies, and are prepared by mixing fats or oils with a caustic alkali in solution, and either boiling until a thick mass is formed or combining cold, and allowing to stand until the combination is effected. The use of soap in the arts and industries is well known. In pharmacy and medicine they are considerably employed.

Soaps are naturally divided into hard soaps, which are made with soda alkali, and soft soaps, which are made with potassa alkali. As different fats vary in proportion of their fatty acids, and the caustic soda and potassa of commerce vary in caustic strength, definite formulas for the soap bases cannot well be given, but the following general formulas and processes adapted from an article by W. J. Menjies in the *Manufacturers' Review* for November 15, 1880, will be satisfactory. The first can be used either for making Castile soap or curd soap:

General Formula for Hard Soaps.

Take exactly 2 pounds of Greenbank's or any other good brand of double refined 98 percent. powdered caustic soda; put it into any suitable iron or metal vessel with 9 pounds of soft water, stir it once or twice with a stirrer; it will dissolve immediately and become quite hot; let it stand until the lye thus made is cold. Weigh out and place in any convenient vessel for mixing and melting exactly $14\frac{1}{2}$ pounds of clean tallow, grease or oil (where oil is used no heating is required). Melt it slowly either with steam or fire until it is liquid and feels warm to the hand—that is to say, not exceeding 100°F . Pour the lye slowly into the melted tallow in a small stream continuously, at the same time stirring with a flat wooden stirrer about three inches broad, continue gently stirring until the lye and melted tallow or oil are thoroughly combined and the mixture appears like honey. Do not stir too long or the mixture is liable to separate again. The time required varies somewhat with the weather and kind of tallow, grease or oil used; from fifteen to twenty minutes will be quite enough. When the mixture is complete, pour it off into an ordinary soap frame; or this may be dispensed with and an old square wooden box may be used for a mould, previously damping the sides with whitewash or water so as to prevent the soap sticking. Put the frame or box in a warm place until the next day, covering it up well with blankets; it will then be found to contain about $25\frac{1}{2}$ pounds of fine hard soap, which can be cut up with a wire into bars for the convenience of weighing etc. Remember the chief points in the above directions, which must be exactly followed. The lye must be allowed to cool. The heated tallow or grease used must not be over a temperature of about 100°F . The lye must be thoroughly stirred into the melted tallow, not tallow or oil into the lye. The exact weight of double refined powdered 98 percent. caustic soda and tallow, grease or oil, must be taken. If the tallow or grease is not clean or contains any salt, it must be "rendered" or purified previous to use, that is to say, boiled with water and allowed to cool, as any salt present spoils the whole operation entirely. Discolored or rancid grease or tallow, however is just as good for common soap-making purposes. If the soap turns out

streaky or uneven, it has not been thoroughly mixed. If very sharp to the taste, too much caustic soda has been used. If soft, mild and greasy, too much tallow has been taken. In either case it should now be thrown into a kettle with a little water and cut into cubes, shavings or very small pieces. In the first case boiling is all that is necessary—in the other instance a very little more oil or a very little more of the double refined 98 percent. caustic soda must be added to the water previous to boiling. None of these things will happen, however, if the above directions are exactly followed, and with the experience gained after making a few batches of soap the whole process is an exceedingly easy one.

Any multiple of the quantities directed in the formula may be taken and manipulated in the same manner.

General Formula for Soft Soap.

Take 5 pounds of Greenbank's or other good brand of pure caustic potash; put it in an iron or earthenware vessel with 9 pounds of water. Stir it once or twice; it will dissolve immediately and become quite hot. Let it stand until the lye thus made is cold. Place in any convenient vessel for mixing $18\frac{1}{2}$ pounds of cottonseed oil and 2 pounds of clean melted tallow. Pour the lye into the oil in a small stream, at the same time stirring with a flat wooden stirrer about three inches broad. Continue gently stirring until the lye and oil are thoroughly combined, and in appearance like honey. Now cover up the vessel and put in a warm place until the next day. The oil and lye will then be found nearly all combined. Stir up well again and leave for a few days, when the mixture will become quite even and saponification complete; the result being the production of about 35 pounds of very stiff potash soap, costing for materials about $3\frac{3}{4}$ cents per pound. If made for use by an actual consumer nothing more need be done; the requisite quantity can be thrown into the scouring vat, either with or without the addition of a small quantity of carbonate of potash to increase the alkali present, and depending on the purpose for which the soap is used.

The potash soap produced in this way is very much more concentrated than the ordinary "fig" soap hitherto sold. If it is desired to make an ordinary soft soap, it can be produced in the following manner: Take 20 pounds of the stiff potash soap and add to it about 7 pounds of water. Put it into a boiling pan and gently heat and stir it so as to mix well together; at the same time adding about $12\frac{3}{4}$ ounces of crystalline carbonate of potash, which will remove all "stringyness" and produce a clear homogeneous soap. It will improve in appearance by keeping for a short time.

The above cold process is simple and effective, and a few pounds of soft soap can advantageously be made by it. With mechanical mixing

apparatus and large pans, soft soap can easily be produced on a large scale by this process.

The following are the soaps of the U. S., and Br. pharmacopœias:

SAPO. U. S. Soap.

Sapo Durus. Br. Hard Soap. [White Castile Soap].

"Soap prepared from sodium hydroxide and olive oil." <U. S.

"Soap made with sodium hydroxide and olive oil; containing about 30 percent. of water." <Br.

The common varieties made from inferior oil and mottled by the addition of an iron salt are extensively sold as ordinary Castile soap, but in medicine and pharmacy only that made with fine olive oil and pure soda should be used.

Uses. It is employed for making oleates, liniments and pills, and is extensively used, mixed with other kinds of soap, for making perfumed and toilet soaps and in powder for making tooth powders etc.

SAPO ANIMALIS. Br. Curd Soap.

"Soap made with sodium hydroxide and a purified animal fat, consisting principally of stearin; containing about 30 percent. of water." <Br.

This is a nearly neutral white soap, generally made with fine tallow and pure soda alkali or caustic soda. It is known as Tallow Soap, and is used as the basis of most of the perfumed toilet soaps. For making fine toilet soaps, curd soap is reduced to shavings by passing it over a plane and then, being moistened, it is combined with the perfuming oils desired, by working them well in with it in a mortar until the mass is of uniform consistence without streaks. For larger manufacturing the soap is "milled" with the oils, and then pressed into cakes. If desired to be colored the coloring matter is well worked in.

In pharmacy it is used for making several plasters, liniments, pills and suppositories.

SAPO MOLLIS. U. S., Br. Soft Soap.

[Sapo Viridis. U. S. P. 1880. Green Soap].

The U. S. P. formula is:

Linseed Oil,	400 Gm. or 40	ounces av.
Potassium Hydroxide,	95 Gm. or 9½	ounces av.
Alcohol,	40 Cc. or 4	fl.ounces
Water,	a sufficient quantity.	

The linseed oil is to be heated on a water-bath or steam-bath, in a deep, capacious vessel, to a temperature of about 70°C. (158°F.). The potassium hydroxide is to be dissolved in water 450 Cc. (or 45 fl.ounces) and the solution warmed to about 70°C. (158°F.). The

warmed solution is then to be added to the linseed oil and mixed thoroughly; the alcohol is then to be incorporated and the heat continued (without stirring) until a small portion of the mixture is found to be soluble in boiling water without the separation of oily drops. It is then allowed to cool and transferred to suitable vessels.

The potassium hydroxide used in this process should be of the full strength directed by the pharmacopœia (85 percent.).

The Br. Sapo Mollis is "Soap made with potassium hydroxide and olive oil." No formula given.

Uses. Besides its use medicinally in the treatment of eczema and some other skin diseases, soft soap may be used advantageously in making tooth washes, shampoo liquids and other toilet requisites in which a liquid soap may be desirable.

Soft soap is soluble in hot water to a nearly clear liquid; and in hot alcohol, without leaving more than 3 percent. of insoluble residue.

Other Soaps.

The foregoing which represent the basic soaps used in pharmacy are all that are official in the U. S. and Br. P. A considerable number of medicated soaps are official in other authorities but their formulas will appear under Medicated and Toilet Soaps in another department of this work.

SCOPOLA. U. S. Scopola.

"The dried rhizome of Scopola Carniolicæ, Jacquin (Fam. Solanacæ), yielding, when assayed as directed, not less than 0.5 percent. of mydriatic alkaloids." <U. S.

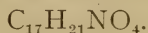
This drug seems to be a connecting link between Atropa and Hyoscyamus, having the characteristics of both.

An assay process for this drug is given in the U. S. P., the method to be employed is identical with that given for Belladonna Leaves, using 10 Gm. of Scopola in No. 60 powder.

Uses. The uses of this drug are similar to belladonna. A fluid-extract is official.

Average dose of powdered scopola.—0.045 Gm.=45 milligrammes ($\frac{3}{4}$ grain).

SCOPOLAMINA. Scopolamine.



An amorphous alkaloid obtained from several species of Scopola, identical with **hyoscyne**, obtained from belladonna and hyoscyamus. Its salts only are used in medicine.

Scopolamine Hydrobromide. U. S. This is official in the U. S. and Germ. pharmacopœias and is further described below.

Scopolamine Hydrochloride. $\text{C}_{17}\text{H}_{21}\text{NO}_4\text{HCl}$ =339.5. This salt of the alkaloid scopolamine may be prepared by saturating diluted

hydrochloric acid with scopolamine, concentrating the solution and crystallizing. It is identical with hyoscyne hydrochloride.

Dose, 0.0005 Gm.. ($\frac{1}{128}$ grain).

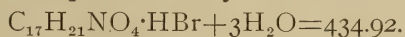
Scopolamine Hydriodide. $C_{17}H_{21}NO_4HI + \frac{1}{2}H_2O = 440$. This may be prepared by saturating diluted hydriodic acid with scopolamine alkaloid, concentrating the solution and crystallizing. It is identical with hyoscyne hydriodide. Dose, $\frac{1}{128}$ grain.

Scopolamine Sulphate. This may be prepared by saturating dilute sulphuric acid with scopolamine alkaloid, concentrating the solution and crystallizing. It is identical with hyoscyne sulphate.

Dose, $\frac{1}{128}$ grain.

SCOPOLAMINÆ HYDROBROMIDUM. U. S.

Scopolamine Hydrobromide.



"The hydrobromide [$HBr \cdot C_{17}H_{21}NO_4 + 3H_2O$] of an alkaloid obtained from plants of the Solanaceæ; chemically identical with hyoscyne hydrobromide." < U. S.

This may be prepared by saturating diluted hydrobromic acid with scopolamine alkaloid, concentrating the solution and crystallizing. Its uses are the same as hyoscyne hydrobromide, which see.

Average dose.—0.005 Gm.=05 milligramme ($\frac{1}{128}$ grain).

SEMINA — SEEDS.

In botany the seed is the fertilized ovule, having the embryo formed within it, which, under favorable conditions will germinate and produce a new plant like the parent from which it came. In commerce the name is frequently applied to something entirely different, as wormseed, which is the unexpanded flower-heads of *san-tonica*, seed-lac, which is the granular lac removed from twigs etc. In pharmacy fruits are often called seeds, as caraway seeds (meaning caraway fruit), coriander seeds (meaning coriander fruit), etc.

In the U. S. pharmacopœia the names of seeds are not followed by the Latin or English word meaning seed, unless some other part of the plant named is official, but in the Br. P. the name of the plant is followed by the Latin name for seeds, and the English name of the plant by the word seeds.

In this work the official seeds are noted in the alphabetical order of subjects, and most of the unofficial seeds are otherwise noted, so they will not be further considered under this heading.

SERUM ANTIDIPHThERICUM. U. S.

Antidiphtheric Serum. Diphtheria Antitoxin.

"A fluid separated from the coagulated blood of a horse, *Equus caballus*, Linné, immunized through the inoculation of diphtheric toxin.

It should be kept in sealed glass containers in a dark place at temperatures between 4.5° and 15°C. (40° and 59°F.)." <U. S.

A yellowish or yellowish-brown transparent or slightly turbid liquid. Sp. gr. 1.025 to 1.040 at 25°C. (77°F.).

This serum gradually loses power by keeping, the loss in a year varying from 10 to 30 percent. Each container should have on it a label stating its antitoxic strength in units, the name and percentage of the antiseptic used for its preservation (if such be used), the date when the serum was last tested, and the date beyond which it will not have the strength indicated on the label.

The standard of strength, expressed in units of antitoxic power, should be that approved or established by the U. S. Public Health and Marine Hospital Service.

Average dose.—3000 units.

Immunizing dose for well persons.—500 units.

Other Serums.

The foregoing is the only serum official in the U. S. and Germ. pharmacopœias. Several serums are prepared from animal fluids in a similar manner and are known as **Antitoxins** or **Biologicals**. These are, chiefly: Antidiphtheria serum or Antitoxin; Antitetanic serum or Tetanus Antitoxin; Antirabies treatment, (Pasteur's); Tuberculin, (Koch's); Antimeningitis serum; Antipneumonic serum; Vaccine Lymph, and many others as remedies for or preventive of certain infectious diseases. There are also many artificial Blood Serums, bearing the names of their originators, which cannot be named in the limits of this article.

SEVUM PRÆPARATUM. U. S., Br. Prepared Suet.

"The intestinal fat of the abdomen of the sheep, *Ovis aries*, Linné, purified by melting and straining." <U. S., Br.

"Prepared Suet should be kept in well-closed vessels impervious to fat. It should not be used after it has become rancid." <U. S.

The fat commonly known as mutton suet is purified by melting and straining. It is insoluble in water or cold alcohol; soluble in 44 parts of boiling alcohol and in about 60 parts of ether. Prepared suet melts between 45° and 50°C. (113° and 122°F.), and congeals between 37° and 40°C. (98.6° and 104°F.).

It consists of stearin, palmitin and olein; and is used in making cerates and ointments and as an application to irritated surfaces, ulcers etc. It is a common domestic remedy for all kinds of sores.

SODIUM OR NATRIUM.

Symbol Na; Atomic weight (O=16) 23; Sp. gr. 0.972.

Sodium is one of the alkali metals, discovered by Davy in 1807, having the same general characteristics as potassium. It is silver-

white, fuses at 194°F. , is volatilized at a red heat and oxidizes rapidly in contact with air, having to be preserved in some hydrocarbon, as mineral naphtha. Thrown upon water it decomposes it with great violence but without flame, differing in this respect from potassium.

The metal sodium is official only in the Br. P. Its symbol, Na, is for Natrium, the name by which it is known in many of the European pharmacopœias, and by which it is universally symbolized in chemistry.

It is prepared in the same manner as potassium (which see), and is the basis of the sodium salts, combining with all acids and negative elements to form them. The salts of sodium are all white, crystallizable, readily soluble, and are of great importance in the arts and in medicine. Sodium and its compounds are more fully described in the Chemical Section, Part I.

The following are the salts of sodium official in the U. S. and Br. pharmacopœias:

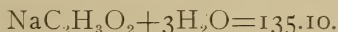
SODA TARTARATA. Br.

Sodium Potassium Tartrate. Tartarated Soda. Rochelle Salt.



This is the British title for Potassii et Sodii Tartras, U. S., or Rochelle Salt, the process for making it being given under the U. S. title, (which see). Dose, 120 to 240 grains.

SODII ACETAS. U. S. Sodium Acetate. Natrium Aceticum.



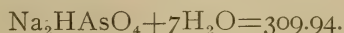
"It should contain in an uneffloresced condition not less than 99.5 percent. of pure Sodium Acetate $[\text{CH}_3\cdot\text{COONa} + 3\text{H}_2\text{O}]$, and should be kept in well-stoppered bottles." < U. S.

This salt may be prepared by neutralizing acetic acid with sodium carbonate, filtering the solution, concentrating by evaporation, and crystallizing. By continuing the evaporation, with stirring, it may be obtained granulated, in which form it is more convenient for pharmaceutical use. It is very soluble in water.

Uses. Sodium acetate is used in pharmacy for making many other salts by double decomposition, and in medicine is much esteemed as a diuretic.

Average dose.—1 Gm. (15 grains).

SODII ARSENAS. U. S. Sodium Arsenate.



"It should contain in an uneffloresced condition not less than 98 percent. of pure Di-sodium-ortho-arsenate $[\text{AsO}(\text{OH})(\text{ONa})_2 + 7\text{H}_2\text{O}]$, and should be kept in well-stoppered bottles." < U. S.

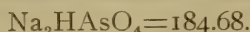
It is employed as an alterative and for the same purposes as other salts of arsenic; being soluble in 1.2 parts of water it is readily made into solution.

Average dose.—0.005 Gm.=5 milligrammes ($\frac{1}{10}$ grain).

Sodii Arsenas, Br., is the anhydrous salt which in the U. S. P. is **Sodii Arsenas Exsiccatus**, the formula for which follows:

SODII ARSENAS EXSICCATUS. U. S.

Exsiccated Sodium Arsenate.



"It should contain not less than 98 percent. of pure anhydrous Di-sodium-ortho-arsenate [$\text{AsO}(\text{OH})(\text{ONa})_2$]."<U. S.

The formula is:

Sodium Arsenate Crystals, a sufficient quantity.

"Break the crystals into small fragments and allow them to effloresce at a temperature between 40° and 50°C. (104° and 122°F.), until they are completely disintegrated; then gradually increase the temperature to 150°C. (302°F.), and continue the drying until the product ceases to lose weight. Reduce it to a fine powder, and transfer it to dry, well-stoppered bottles."<U. S.

An amorphous white powder soluble in 3 parts of water at 25°C. (77°F.), and very soluble in boiling water.

Sodii Arsenas. Br. Sodium Arsenate. In the Br. P. the salt bearing the title **Sodii Arsenas** is the same as is known in the U. S. P. as **Sodii Arsenas Exsiccatus**. The Br. formula is:

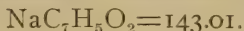
"The anhydrous salt di-sodium hydrogen arsenate, Na_2HAsO_4 , obtained by exposing to a temperature of 300°F. (148.9°C.) crystallized sodium arsenate, which may be prepared by treating with water the product of the fusion of arsenious anhydride with sodium nitrate and sodium carbonate."<Br.

Uses. It is used for the same purposes as Sodium Arsenate, but being deprived of the water of crystallization it is about double its strength. In pharmacy it is used for making **Liquor Sodii Arsenatis**, **Fowler's Solution**, and in some other preparations.

Average dose.—0.003 Gm.=33 milligrammes ($\frac{1}{20}$ grain).

SODII BENZOAS. U. S., Br.

Sodium Benzoate. Natrium Benzoicum.



"It should contain not less than 99 percent. of pure Sodium Benzoate [$\text{C}_6\text{H}_5\cdot\text{COONa}$], and should be kept in well-stoppered bottles."<U. S.

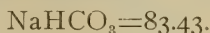
This salt may be prepared by adding benzoic acid to a hot concentrated solution of pure sodium carbonate as long as effervescence occurs, then evaporating to dryness and granulating by stirring, or by crystallizing from the solution.

Uses. This salt is used in the treatment of rheumatism and some kidney diseases. Also in septic diseases, in doses of 20 to 60 grains.

The recent use of Sodium Benzoate as a food preservative has brought it into considerable prominence. It is allowed under the national and most of the state laws, and is extensively used in food products as a preservative, $\frac{1}{10}$ of 1 percent. being the amount usually used.

SODII BICARBONAS. U. S., Br. Sodium Bicarbonate.

Natrium Bicarbonicum. "Baking Soda."



"It should contain not less than 99 percent. of pure Sodium Bicarbonate $[\text{CO}(\text{OH})(\text{ONa})]$, and should be kept in well-closed vessels, in a cool place." <U. S.

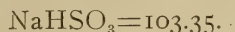
"Sodium Bicarbonate, NaHCO_3 , may be obtained by exposing crystals of sodium carbonate to carbonic anhydride, or by the interaction of sodium chloride and ammonium bicarbonate." <Br.

Commercial sodium bicarbonate is prepared by saturating sodium carbonate with carbon dioxide gas. As thus prepared it contains some impurities which are not desirable for medicinal use., the U. S. P. directing that the official salt shall contain 99 percent. of sodium bicarbonate. This may be made from the commercial salt by percolating 2 pounds av., with 3 pints of water, which dissolves out the impurities; the residue left in the percolator is then dried on blotting paper. For most purposes, however, the commercial salt is employed. Soluble in 12 parts of water at N. T.

Uses. Sodium bicarbonate is used for making many pharmaceutical preparations, and in medicine as an anti-acid. In making aerated waters it is a convenient source of carbonic acid gas, which is liberated when it is decomposed with an acid.

Average dose.—1 Gm. (15 grains).

SODII BISULPHIS. U. S. Sodium Bisulphite.



"It should contain not less than 90 percent. of pure Sodium Bisulphite, and should be kept in a cool place, in small, completely filled, well-stoppered bottles." <U. S.

SODII BORAS. U. S. Sodium Borate.

Borax. Br. Biborate of Sodium.



"It should contain in the uneffloresced condition not less than 99 percent. of pure Sodium tetraborate, and should be kept in well-stoppered bottles." <U. S.

For Br. description see the title Borax,

Soluble in 20.4 parts of water at 25°C. (77°F.), and in 0.5 part of boiling water; soluble in 1 part of glycerin at 80°C., but insoluble in alcohol.

Average dose.—0.500 Gm.=500 milligrammes (7½ grains).

As this is commonly known as Borax it is more fully described under that title, which see.

SODII BROMIDUM. U. S., Br. Sodium Bromide.

NaBr=102.24.

"It should contain, when dried, not less than 97 percent. of pure Sodium Bromide, and should be kept in well-stoppered bottles." < U. S.

This salt may be prepared according to the Br. P. in the same manner as is directed for making potassium bromide, sodium hydroxide being used in place of potassium hydroxide. It may also be prepared by decomposing ferrous bromide with sodium carbonate, iron carbonate precipitating, and leaving sodium bromide in solution which may be obtained by evaporating and crystallizing. It is soluble in 1.7 parts of water and in 12.5 parts of alcohol at 25°C. (77°F.).

Uses. This salt is used for the same purposes as potassium bromide, but is thought to be less irritating to the stomach.

Average dose.—1 Gm. (15 grains).

SODII CARBONAS. Br. Sodium Carbonate.

"Sodium Carbonate, $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$, may be obtained from sodium chloride, either by interaction with ammonium bicarbonate and subsequent ignition, or by its conversion into sodium sulphate and the action of heat on a mixture of the sulphate with carbon and calcium carbonate." < Br.

Soda Ash is an impure sodium carbonate prepared by first converting common salt into sodium sulphate by treating it with sulphuric acid, and then by heating the sodium sulphate with calcium carbonate (limestone), and fine coal, which decomposes the sodium sulphate, forming insoluble calcium sulphate and soluble sodium carbonate, which is dissolved out, evaporated to dryness and further carbonated by calcining with one-fourth its weight of sawdust. This mass is then redissolved in water and the solution evaporated to dryness, forming the soda ash of commerce, an article of great commercial importance in the manufacture of paper, glass etc.

Sodium Carbonate is prepared from soda ash by lixiviation and crystallization—soda ash containing about 50 percent. of commercial sodium carbonate. It is also prepared by the ammonia process, and by the Cryolite process, the resultant product being the same.

Uses. It is extensively employed in the industrial arts, and is the source of most of the sodium salts. It is seldom given in medicine except in combination. The dose is 5 to 20 grains.

SODII CARBONAS EXSICCATUS. Br.**Exsiccated Sodium Carbonate. Dried Sodium Carbonate.**

"Nearly anhydrous Sodium Carbonate, Na_2CO_3 , which is obtained by heating sodium carbonate until it loses nearly 63 percent. of its weight." <Br.

This is prepared by breaking sodium carbonate into small fragments and allowing it to effloresce by exposure to warm air for several days, then heating it to 45°C . (113°F .), until it has been converted into a white powder weighing one one-half as much as the quantity taken, it is then passed through a fine sieve. The Br. P. directs sodium carbonate in crystals to be dried until vapors cease to be evolved, leaving a residue entirely deprived of water, Na_2CO_3 .

Uses. This is better for some uses in pharmacy than the crystallized salt, as its water of crystallization is driven off. It is used for making pills and powders.

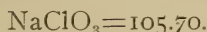
SODII CARBONAS MONOHYDRATUS. U. S.**Monohydrated Sodium Carbonate.**

"It should contain not less than 85 percent. of pure anhydrous Sodium Carbonate $[\text{CO} \cdot (\text{ONa})_2]$, corresponding to not less than 99.5 percent. of the crystallized monohydrated salt." <U. S.

This salt takes the place in U. S. official combinations of sodium carbonate which was official in the former revision. Sodium carbonate contains 10 parts of H_2O in its molecule, as water of crystallization, while monohydrated sodium carbonate contains but 1 part of water.

It is a white, crystalline powder, odorless and having a strongly alkaline taste. It is soluble in 2.9 parts of water at 25°C . (77°F .), and in 1.8 parts of boiling water; insoluble in alcohol and ether, but soluble in 8 parts of glycerin.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

SODII CHLORAS. U. S. Sodium Chlorate.

"It should contain not less than 99 percent. of pure Sodium Chlorate $[\text{ClO}_2 \cdot \text{ONa}]$."

"This salt should be kept in well-stoppered bottles, and great caution should be observed in handling it, as dangerous explosions are liable to occur when it is heated or subjected to concussion or trituration with organic substances (cork, tannic acid, sugar etc.), or other easily oxidizable substances." <U. S.

It may be prepared by decomposition between acid sodium tartrate, in solution, and potassium chlorate in solution. Acid potassium tartrate is precipitated and sodium chlorate remains in solution. The filtered solution is evaporated and crystallized.

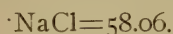
This salt is analagous to potassium chlorate and may be used instead of it for medicinal purposes, being much more soluble it is preferable for solutions etc.

It is soluble in 1 part of water and in about 100 parts of alcohol at 25°C. (77°F.); in 0.5 part of boiling water, in about 40 parts of boiling alcohol; also in about 5 parts of glycerin.

Uses. This may be used for the same purpose as potassium chlorate and is preferable for solutions, being more soluble. Dose 10 to 20 grains.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

SODII CHLORIDUM. U. S. Br. Sodium Chloride.



"It should contain, when dried, not less than 99 percent. of pure Sodium Chloride." <U. S.

"Sodium Chloride, NaCl, is common salt, purified." <Br.

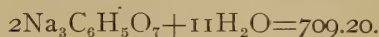
Commonly known as Salt. It has not until recently been much used in medicine, but the introduction of normal salt solution for intravenous injection has of late, brought it into prominence as a remedial agent.

It is soluble in 2.8 parts of water at 25°C. (77°F.), and in 2.5 parts of boiling water; almost insoluble in alcohol.

This is one of the most abundant and widely distributed of natural salts. It is found in beds and mines as rock salt, and in solution in sea water, and salt springs and wells obtained by drilling, from which it is separated in crystalline form by evaporation. It is extensively used for various industrial purposes and as a seasoning and preservative of food. In pharmacy it is employed as a source of chlorine, and in medicine is used as a styptic and for intravenous injection and some other purposes.

Average dose.—Emetic, 16 Gm. (240 grains).

SODII CITRAS. U. S. Sodium Citrate.



"It should contain not less than 97 percent. of pure sodium citrate [$2\text{C}_3\text{H}_4(\text{OH})(\text{COONa})_3 + 11\text{H}_2\text{O}$], and should be kept in well-stoppered bottles." <U. S.

It may be readily prepared by neutralizing a solution of citric acid with sodium bicarbonate, concentrating the solution and reducing by very moderate heat to a granular powder.

This newly official sodium salt is used for similar purposes as potassium citrate. It is soluble in 1.1 parts of water at 25°C. (77°F.), and in 0.4 part of boiling water.

Average dose.—1 Gm. (15 grains).

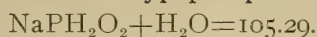
SODII CITRO-TARTRAS EFFERVESCENS. Br.**Effervescent Sodium Citro-Tartrate.**

This is adapted to the Br. formula as follows:

Sodium Bicarbonate, in powder,	170 Gm. or 17 ounces
Tartaric Acid, in powder,	90 Gm. or 9 ounces
Citric Acid, in powder,	60 Gm. or 6 ounces
Refined Sugar, in powder,	50 Gm. or 5 ounces

Mix the powders thoroughly and place them in a dish or pan of suitable form, heated to between 200° and 220°F. (93.3° and 104.4°C.), and when the particles of powder begin to aggregate, stir them assiduously until they assume a granular form, then, by means of suitable sieves, separate the granules of uniform and most convenient size, dry them at a temperature not exceeding 130°F. (54.4°C.), and preserve then in well-stopped bottles.

Uses. This is an effervescent salt when added to water, and is used as a refrigerant. It is given 60 to 120 grains, in part of a glass of water.

SODII HYPOPHOSPHIS. U. S., Br.**Sodium Hypophosphite.**

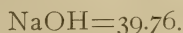
"It should contain not less than 98 percent. of pure Sodium Hypophosphite [$\text{PO} \cdot \text{H}_2\text{ONa} + \text{H}_2\text{O}$], and should be kept in well-stoppered bottles. Caution should be observed in dispensing sodium hypophosphite as explosion is liable to occur when it is triturated or heated with nitrates, chlorates, or other oxidizing agents." < U. S.

Soluble in about 1 part of water and in about 25 parts of alcohol at 25°C. (77°F.).

This salt may be most conveniently prepared by adding sodium carbonate to solution of calcium hypophosphite as long as a precipitate of calcium carbonate is formed, then filtering and evaporating to dryness by heat on a steam-bath, stirring occasionally to granulate the salt.

Uses. It is similar in medicinal properties to other hypophosphite salts, and is much used in making syrups and solutions of hypophosphites compound, the dose being 5 to 10 grains.

Average dose.—1 Gm. (15 grains).

SODII HYDROXIDUM. U. S. Sodium Hydroxide.**Natrium Causticum. Soda. Caustic Soda.**

"It should contain not less than 90 percent. of pure anhydrous Sodium Hydroxide, and not more than 2 percent. of other inorganic substances, with the exception of water. It should be kept in well-stoppered bottles made of hard glass." < U. S.

Note the change of title in the present revision, corresponding with its chemical composition. It is commercially known as Caustic Soda or Concentrated Lye. It is soluble in about 1 part of water at 25°C. (77°F.), and in 0.8 part of boiling water. Very soluble in alcohol.

SODII IODIDUM. U. S., Br. Sodium Iodide.

$\text{NaI}=148.78.$

"It should contain not less than 98 percent. of pure Sodium Iodide, and should be kept in well-stoppered bottles." <U. S.

"Sodium Iodide, NaI , may be prepared from iodine and sodium hydroxide. It may also be made by decomposing a solution of ferrous bromide; the salt being crystallized at a temperature less than 68°F. (20°C.)." <Br.

This may be made in exactly the same manner as potassium iodide, except that sodium hydroxide must be used instead of potassium hydroxide. It may also be made by decomposing a solution of ferrous iodide with sodium carbonate, the solution being filtered, evaporated and crystallized.

Soluble in about 0.5 part of water and in 3 parts of alcohol at 25°C. (77°F.); in about 0.33 part of boiling water and in 1.4 parts of boiling alcohol.

Uses. Its uses are similar to potassium iodide.

Average dose.—0.500 Gm.=500 milligrammes (7½ grains).

SODII NITRAS. U. S. Sodium Nitrate.

$\text{NaNO}_3=84.45.$

"It should contain not less than 99 percent. of pure Sodium Nitrate [$\text{NO}_2\cdot\text{ONa}$], and should be kept in well-stoppered bottles." <U. S.

This is a native salt obtained from Chili and Peru, and quite extensively sold as "Chili saltpetre." Being the cheapest source of nitrates, it is extensively used for making nitric acid and other preparations.

This is similar in its properties and action to potassium nitrate (saltpetre), and is sometimes substituted for it commercially on account of its lower price. It is soluble in about 1.1 parts of water and in about 100 parts of alcohol at 25°C. (77°F.); and in 0.6 part of boiling water and in 40 parts of boiling alcohol.

Uses. Its medicinal uses are similar to those of potassium nitrate, but it is not considered so effective.

Average dose.—1 Gm. (15 grains).

SODII NITRIS. U. S., Br. Sodium Nitrite.

$\text{NaNO}_2=68.57.$

"It should contain not less than 90 percent. of pure Sodium Nitrite [$\text{NO}\cdot\text{ONa}$], and should be kept in well-stoppered bottles." <U. S.

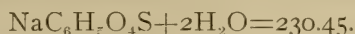
"A salt obtained by fusing sodium nitrate with metallic lead." <Br.

Soluble in 1.4 parts of water at 25°C. (77°F.), and very soluble in boiling water; but slightly soluble in alcohol.

Uses. This salt is used in pharmacy in the preparation of spirit of nitrous ether. In medicine it is used as a diuretic and refrigerant.

Average dose.—0.065 Gm.=65 milligrammes (1 grain).

SODII PHENOLSULPHONAS. U. S. Sodium Phenolsulphonate.



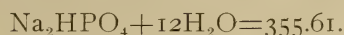
"It should contain not less than 99 percent. of pure Sodium Phenolsulphonate [$\text{C}_6\text{H}_4(\text{OH})\text{SO}_3\text{Na}$ 1:4], and should be kept in well-stoppered bottles." <U. S.

Soluble in 4.8 parts of water, and in about 130 parts of alcohol at 25°C. (77°F.); in 0.7 part of boiling water, and in 10 parts of boiling alcohol.

This is official in the Br. P. as Sodii Sulphocarbolas, which see.

Average dose.—0.250 Gm.=250 milligrammes (4 grains).

SODII PHOSPHAS. U. S., Br. Sodium Phosphate.



"It should contain in an uneffloresced condition, not less than 99 percent. of pure Di-sodium-ortho-phosphate [$\text{PO}(\text{OH})(\text{ONa})_2 + 12\text{H}_2\text{O}$], and should be kept in well-stoppered bottles in a cool place." <U. S.

"This salt, di-sodium hydrogen phosphate, $\text{Na}_2\text{HPO}_4 + 12\text{H}_2\text{O}$, may be obtained by the interaction of sodium carbonate and the solution of acid calcium phosphate produced on mixing bone-ash and sulphuric acid." <Br.

It is soluble in about 5.5 parts of water at 25°C. (77°F.); but is insoluble in alcohol.

Uses. Sodium phosphate is considerably used in pharmacy to prepare other phosphates, by double decomposition, and is given as a cathartic in doses of from $\frac{1}{4}$ to 1 ounce.

Average dose.—2 Gm. (30 grains).

SODII PHOSPHAS EFFERVESCENS. U. S., Br.

Effervescent Sodium Phosphate.

Exsiccated Sodium Phosphate, in fine powder,

200 Gm. or 7 oz. av. + 24 grains

Sodium Bicarbonate, dried and powdered,

477 Gm. or 16 oz. av. + 361 grains

Tartaric Acid, dried and powdered,

252 Gm. or 8 oz. av. + 389 grains

Citric Acid, uneffloresced crystals,

162 Gm. or 5 oz. av. + 312 grains

To make about 1000 Gm. or 35 oz. av. + 2 drachms

The citric acid is to be powdered and mixed intimately with the exsiccated sodium phosphate and tartaric acid and then the sodium bicarbonate is to be thoroughly incorporated with the mixture.

The mixed powders are to be placed on a plate of glass or in a suitable dish, in an oven heated to between 93° and 104°C . (199.4° and 219.2°F .). When the mixture has acquired a moist consistence, by the aid of careful manipulation with a wooden spatula, it is to be rubbed through a No. 6 tinned-iron sieve and the granules dried at a temperature not exceeding 54°C . (129.2°F .). The product is to be kept in well-stoppered bottles.

Average dose.—8 Gm. (120 grains).

The Br. formula is:

Sodium Phosphate, in crystals,	50 ounces or 500 Gm.
Sodium Bicarbonate, in powder,	50 ounces or 500 Gm.
Tartaric Acid, in powder,	27 ounces or 270 Gm.
Citric Acid, in powder,	18 ounces or 180 Gm.

Dry the sodium phosphate until it has lost 50 percent. of its weight; powder the product and mix it with the other ingredients. Place the whole in a dish or pan of suitable form, heating to between 200° and 220°F . (93.3° and 104.4°C .). When the mixture, by the aid of careful manipulation, has assumed a granular character, separate it into granules of uniform and convenient size by means of suitable sieves. Dry the granules at a temperature not exceeding 130°F . (54.4°C .). The product should weigh about 100 ounces (1000 Gm.). <Br.

SODII PHOSPHAS EXSICCATUS. U. S.

Exsiccated Sodium Phosphate.

"It should contain not less than 99 percent. of pure anhydrous Sodium Phosphate $[\text{PO}(\text{OH})(\text{ONa})_2]$, and should be kept in well-stoppered bottles." <U. S.

Sodium phosphate, any convenient quantity, is allowed to effloresce for several days in warm air at a temperature of from 25° to 30°C . (77° to 86°F .), the drying is to be continued in an oven and the temperature is to be maintained until the salt ceases to lose weight. The residue is then to be powdered and sifted and preserved in well-stoppered bottles.

This powder has the properties of sodium phosphate but in a much more concentrated form, being about twelve times stronger than the crystalline salt. It absorbs moisture readily.

Average dose.—1 Gm. (15 grains).

SODII PYROPHOSPHAS. U.S. Sodium Pyrophosphate.



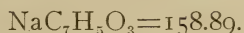
"It should contain, in a uneffloresced condition, not less than 99 percent. of pure Sodium Pyrophosphate $[(\text{PO})_2\text{O}(\text{ONa})_4 + 10\text{H}_2\text{O}]$, and should be kept in well-stoppered bottles." <U. S.

This is prepared by heating sodium phosphate in a suitable vessel to redness. It first melts, losing water of crystallization by evaporation, only 40 percent. of the salt remaining. The heat is then increased to 300°C. (572°F.), at which temperature it is converted into a tribasic phosphate, or pyrophosphate. This residue is then dissolved in water, the solution filtered, and the salt crystallized, making sodium pyrophosphate.

Soluble in about 11.5 parts of water at 25°C. (77°F.); and in about 1.1 parts of boiling water; insoluble in alcohol.

Average dose.—2 Gm. (30 grains).

SODII SALICYLAS. U. S., Br. Sodium Salicylate.



"It should contain not less than 99.5 percent. of pure Sodium Salicylate [$\text{C}_6\text{H}_4(\text{OH})\text{COONa}$], and should be kept in well-stoppered bottles, protected from heat and light." < U. S.

"Sodium Salicylate, $(\text{C}_6\text{H}_4\cdot\text{OH}\cdot\text{COONa})_2, \text{H}_2\text{O}$, may be obtained by the interaction of salicylic acid and sodium carbonate or sodium hydroxide." < Br.

This is most conveniently prepared from salicylic acid by mixing 10 parts with water to form a paste; then adding 104 parts of pure crystallized sodium carbonate reduced to a moderately fine powder. The reaction proceeds with effervescence caused by escaping carbonic acid gas. The solution is then strained, heated in a porcelain capsule until all gas is expelled, made neutral by the addition of either salicylic acid or sodium carbonate, and evaporated at a low heat to dryness.

The method of preparing this from phenol is described under salicylic acid, which see.

This is a favorite remedy for rheumatism. It is soluble in 0.8 part of water and in 5.5 parts of alcohol at 25°C. (77°F.). It is also soluble in glycerin and very soluble in boiling water or boiling alcohol.

Average dose.—1 Gm. (15 grains).

SODII SULPHAS. U. S., Br. Sodium Sulphate.

Glauber's Salt.



"It should contain, in an uneffloresced condition, not less than 99 percent. of pure Sodium Sulphate [$\text{SO}_2(\text{ONa})_2 + 10\text{H}_2\text{O}$], and should be kept in well-stoppered vessels in a cool place." < U. S.

"Sodium Sulphate, $\text{Na}_2\text{SO}_4, 10\text{H}_2\text{O}$, may be obtained by the interaction of sodium chloride and other sodium salts with sulphuric acid." < Br.

This salt is more familiarly known as Glauber's Salt, and is chiefly obtained as a by-product of the manufacture of other chemicals. It

may be readily made by adding sulphuric acid to a solution of sodium carbonate until it is neutralized, evaporating and crystallizing.

This salt effloresces when exposed to air, and finally loses all its water of crystallization. It fuses at 33°C . (114°F .), and when heated to 100°C . (212°F .), parts with all its water of crystallization (59.9 per cent. It is soluble in 2.8 parts of water at 15°C . (59°F .), and much more soluble in warm water.

Uses. It is used in making other preparation, and as a "physic" for horses and cattle. It is also preferred by some to Epsom salts as a cathartic, in doses of half to one ounce.

Average dose.—16 Gm. (240 grains).

SODII SULPHAS EFFERVESCENS. Br.

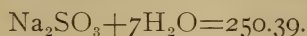
Effervescent Sodium Sulphate.

Sodium Sulphate, in crystals,	50 ounces or 500 Gm.
Sodium Bicarbonate, in powder,	50 ounces or 500 Gm.
Tartaric Acid, in powder,	27 ounces or 270 Gm.
Citric Acid, in powder,	18 ounces or 180 Gm.

Dry the sodium sulphate until it has lost 50 percent. of its weight; powder the product and mix it with the other ingredients. Place the whole in a dish or pan of suitable form, heated between 200° and 220°F . (93.3° and 104.4°C .). When the mixture, by careful manipulation of the powder, begins to aggregate, stir continuously until it has assumed a granular character; then separate into granules of uniform and convenient size, by means of suitable sieves. Dry the granules at a temperature not exceeding 130°F . (54.4°C .). The product should weigh about 100 ounces (or 1000 Gm.).

Dose, 60 to 120 grains for repeated administration, and $\frac{1}{4}$ to $\frac{1}{2}$ ounce for a single administration. <Br.

SODII SULPHIS. U. S., Br. Sodium Sulphite.



"It should contain, in the uneffloresced and air-dried condition, not less than 96 percent. of pure Sodium Sulphite, and should be kept in well-stoppered bottles in a cool place." <U. S.

"Sodium Sulphite, $\text{Na}_2\text{SO}_3 \cdot 7\text{H}_2\text{O}$, may be obtained by interaction of sulphurous acid and sodium carbonate." <Br.

This may be most conveniently prepared by passing sulphurous acid gas through a concentrated solution of sodium carbonate until it is completely saturated and the Acid Sodium Sulphite is formed. To this an equal weight of sodium carbonate is then added, making a solution of neutral Sodium Sulphite, which, when evaporated, with constant stirring, to dryness, yields sodium sulphite as a granular salt, which is preferred for medicinal use. A crystallized salt is also obtained by crystallizing from the solution.

Soluble in 2 parts of water at 25°C. (77°F.), and in 1.4 parts of boiling water; only slightly soluble in alcohol.

Uses. This salt is used in the preparation of some pharmaceuticals, and in solution as an anti-ferment. It is also given in doses of from 10 to 30 grains.

Average dose.—1 Gm. (15 grains).

SODII SULPHOCARBOLAS. Br. Sodium Sulphocarbolate.

Sodium Paraphenolsulphonate.

"Sodium Sulphocarbolate may be obtained by dissolving phenol in excess of sulphuric acid and converting the phenolsulphuric acid so obtained into a sodium salt." <Br.

This may be prepared by mixing equal parts by weight of C. P. sulphuric acid and pure carbolic acid. The mixture must then be heated to a temperature of 55°C. (155°F.) for several days, and after that 20 parts of water added. Two parts of barium carbonate are then mixed, a little at a time, with the solution to remove excess of acid. The solution is then filtered and the barium sulphocarbolate remaining in solution is decomposed by adding sodium carbonate as long as a precipitate is formed. The liquid is then filtered, concentrated and crystallized.

This is soluble in 4.8 parts of water and in 132 parts of alcohol at N. T.; in 0.7 part of boiling water and in 10 parts of boiling alcohol. At a little above 100°C. (212°F.) it loses all its water of crystallization (15.5 percent.) and becomes white.

SODII THIOSULPHAS. U. S. Sodium Thiosulphate.



[Sodii Hyposulphis, Pharm. 1890].

"It should contain not less than 98 percent. of pure Sodium Thiosulphate, and should be kept in well-stoppered bottles." <U. S.

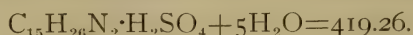
Note the change in the Latin and English title which was in the former revision Sodium Hyposulphite.

Soluble in about 0.35 part of water at 25°C. (77°F.), but insoluble in alcohol.

Average dose.—1 Gm. (15 grains).

Other Sodium Salts.

The foregoing are the salts of sodium official in the U. S. and Br. pharmacopœias, but some other salts are known and have their uses in pharmacy and medicine. They are mostly noted in the Chemical Section of the work, Part I., under the title Sodium.

SPARTEINÆ SULPHAS. U. S. Sparteine Sulphate.

"The sulphate [$SO_2(OH)_2 \cdot C_{15}H_{26}N_2 + 5H_2O$] of an alkaloid obtained from scoparius. Sparteine sulphate should be kept in well-stoppered amber-colored vials." < U. S.

It may be prepared by percolating scoparius with water acidulated with sulphuric acid, concentrating the percolate, crystallizing and purifying in the same manner as other alkaloidal salts. It is soluble in 1.1 parts of water and 2.4 parts of alcohol at 25°C. (77°F.).

Average dose.—0.010 Gm.=10 milligrammes ($\frac{1}{8}$ grain).

SOLUTIONS.

Most of the solutions official in the pharmacopœias are included under the heading **Liquores**, but a considerable number, not official, are used for various purposes; the formulas for those most important are given under this heading.

**SOLUTIONS FOR COMBINING WITH ELIXIRS,
SYRUPS AND OTHER PREPARATIONS.**

The preparations included under this heading are mostly strong solutions of chemical salts, convenient for combining with elixirs, emulsions, syrups etc. A few, however, are intended to be used or prescribed as they are. Several other solutions useful for similar purposes will be found under other headings, as coloring solutions, dialysates, official solutions etc. These are the solutions referred to in the various elixirs, syrups, emulsions etc., when it is noted that "an equivalent quantity of the solution of the specified salt may be used."

Solution Bismuth and Ammonium Citrate.

For combining with elixirs etc., a strong solution of bismuth and ammonium citrate is desirable to use instead of the salt, as an equivalent quantity may be added to any preparation and thus save the time and trouble of dissolving the salt. It may be made as follows:

Bismuth and Ammonium Citrate,	8 $\frac{1}{3}$ ounces av.
Ammonia Water, q. s., about	1 $\frac{1}{2}$ fl.ounces
Warm Water, sufficient to make	16 fl.ounces

To 8 ounces of warm water contained in a mortar add the bismuth salt in small portions at a time, and ammonia water, a little at a time, rubbing them well together until the salt is all dissolved, taking care that ammonia shall not be in excess enough for its odor to be noticeable, then add sufficient water to make a pint and filter.

This solution contains 50 percent. of the bismuth salt, therefore in using it in elixirs etc., where bismuth and ammonium citrate is directed, twice the quantity stated of the salt, or 2 minims for each grain should be used.

Concentrated Solution of Bismuth. B. P. C. Bismuth subnitrate 7 ounces, nitric acid 5 fl.ounces, distilled water 5 fl.ounces; dissolve by the aid of a little heat, and add after cooling citric acid 5 ounces, previously dissolved in distilled water 7 fl.ounces. Add gradually, with stirring, sodium bicarbonate $8\frac{3}{4}$ fl.ounces, previously dissolved in distilled water 7 fl.ounces. Wash the precipitate by decantation with successive portions of distilled water until the washings are free from nitrates. Collect the precipitate and after draining dissolve it in solution of ammonia 6 fl.ounces, or a sufficiency; then add solution of ammonium citrate 12 fl.ounces and distilled water sufficient to produce 50 fl.ounces.

This solution contains about 25 percent. of bismuth and ammonium citrate. If used when solution of bismuth is directed in formulas for elixirs etc., take double the quantity that is directed of the foregoing formula.

Solution of Calcium (Lime) Lactophosphate.

Solution of Calcium Phosphate,	8 fl.ounces
Concentrated Lactic Acid,	1 fl.ounce

Evaporate the solution of calcium phosphate by the heat of a water-bath to 7 fl.ounces, and when cool add the concentrated lactic acid.

This solution may also be made by dissolving 1 ounce of soluble lime lactophosphate in sufficient water to make 4 fl.ounces.

Four minims of this solution represent 1 grain of calcium lactophosphate.

Solution of Calcium (Lime) Phosphate.

Precipitated Calcium Phosphate,	2 ounces av.
Phosphoric Acid, 50 percent.,	6 fl.ounces
Distilled Water, a sufficient quantity.	

Put the phosphoric acid in a porcelain evaporating dish and add the calcium phosphate in small portions, stirring it well with the acid. When all is added heat moderately by a water-bath, stirring occasionally for several hours, then heat on a sand-bath to about 240°F. , stirring occasionally for several hours, until the liquid is reduced to a granular crystalline mass. Allow this to cool and add sufficient distilled water that when dissolved the liquid shall measure 10 fl.ounces, and filter. As this is a saturated solution it may happen that it may solidify or become gelatinous, but it is only necessary to add a small quantity of water and dissolve by the heat of a water-bath before using.

Four minims of this solution represent about 1 grain of the salt, which, in this solution, is converted from the phosphate into the biphosphate of calcium.

This solution is used for making several elixirs, syrups etc., and as the basis of solution of calcium lactophosphate. A soluble salt,

biphosphate of calcium, may be prepared by concentrating this solution and crystallizing.

A solution of phosphate of lime or calcium has formerly been prepared by dissolving precipitated phosphate of calcium in sufficient hydrochloric acid, diluted with water, filtering the solution, precipitating it with ammonia or solutions of the alkaline carbonates, washing the precipitate, draining and pressing it, and dissolving it in phosphoric acid; but it is believed the method above described will be more satisfactory.

Solution of Carbolic Acid.

Although a standard solution of carbolic acid is not official, such a preparation is furnished by manufacturers, and by common consent is made to contain 5 grains of carbolic acid in each fluid drachm.

Carbolic Acid, (crystals), 640 grains

Glycerin and Water, each, a sufficient quantity.

Liquify the acid by the aid of heat and add 2 ounces of glycerin to the solution, then add enough water to make the measure 14 fl.ounces. If the solution is then clear, add enough water to make 16 fl.ounces, but if it should be milky, add enough glycerin to make clear, then sufficient water to make the measure a pint, and filter.

Solutions of carbolic acid of other strengths may be made in the same manner. The Liquified Phenol is generally used.

Solution of Citric Acid.

A convenient solution of citric acid for combining may be made as follows:

Citric Acid, 8⅓ ounces av.

Water, sufficient to make 16 fl.ounces

Dissolve the acid in half a pint of hot water and when cool make up the measure with water to a pint.

This is a 50 percent. solution and will keep without change. Use 2 minims of this solution for each grain of citric acid directed in the formula.

Solution of Hypophosphites Compound.

Calcium Hypophosphite, 256 grains

Sodium Hypophosphite, 128 grains

Potassium Hypophosphite, 64 grains

Iron Hypophosphite Solution, 4 fl.drachms

Hypophosphorus Acid, diluted, 4 fl.drachms

Water, sufficient to make 16 fl.ounces

Rub the hypophosphite salts to a fine powder and then with water in portions of 4 ounces each until they are dissolved; add the solution and acid and then filter.

This solution is not intended to combine with other preparations but to be used as it is. It is similar to a preparation which was once extensively sold as a proprietary medicine—"Churchill's Solution of Hypophosphites Compound," but it has been mostly superseded by various syrups of hypophosphites.

A fl.drachm contains about 4 grains of hypophosphites. The dose is a teaspoonful to a dessertspoonful.

Liquor Hypophosphitum Compositus of the B. P. C. for which the formula is given is similar to the above, but contains about 50 per cent. more of the hypophosphite salts.

Solution of Iron and Ammonium Citrate:

Iron and Ammonium Citrate,	8 $\frac{1}{3}$ ounces av.
Water, sufficient to make	16 fl.ounces

Dissolve the iron salt in half a pint of hot water, and when cool add enough water to make 16 fl.ounces.

This is a fifty percent. solution convenient for using in elixirs, syrups etc., when the scale salt is directed. Use 2 minims for each grain of the salt directed in the formula.

Solution of Ferric Citrate, U. S. P., may be used in many preparations instead of this, but is not so readily held in solution.

Solution Iron Chloride. (Citro-chloride)

(Tasteless Tincture Iron Chloride).

Solution Iron Chloride,	4 fl.ounces
Sodium Carbonate,	10 ounces av.
Citric Acid,	6 ounces av.
Water, sufficient to make	16 fl.ounces

Dissolve the citric acid in 4 fl.ounces of boiling water, and add the sodium carbonate, in crystals, gradually, until all is added and effervescence has ceased; then add the solution of iron chloride and enough water to make 16 fl.ounces. This is a solution of Citro-Chloride of Iron and Sodium.

It may also be made by dissolving 6 ounces av. of potassium or sodium citrate in half a pint of water and adding the solution of iron and then enough water to make the measure a pint.

Uses. This solution is the same strength of iron chloride as the official tincture iron chloride, and may be used for the same purposes and in the same dose. It is somewhat acid, but the styptic taste of the iron is avoided. It is used in making several elixirs and syrups, as Elixir Gentian with Tincture Iron Chloride etc., and is employed in the same quantity as the official tincture. It may also be used as an iron tonic in place of the ordinary tincture of iron chloride and has the advantage of being comparatively tasteless.

Solution of Iron Hypophosphite.

Solution of Iron Phosphate,	2 fl.ounces
Hypophosphorous Acid, diluted,	1 fl.ounce
Glycerin,	1 fl.ounce

Mix them. Although this is not, chemically, a true solution of iron hypophosphite, it is, in effect, the same for all pharmaceutical and medicinal use, and is readily made and permanent.

Four minims of this solution represent 1 grain of the iron salt.

Liquor Ferri Hypophosphitis Fortis, of the B. P. C., which is a true solution of ferric hypophosphite, 40 grains to a fl.ounce, may be used instead of the above, but three times the measure is required as it represents only one-third the quantity of the iron salt.

Solution of Iron Lactophosphate.

Solution of Iron Phosphate,	2 fl.ounces
Glycerin,	1 fl.ounce
Concentrated Lactic Acid,	1 fl.ounce

Mix them. Four minims of this solution represent 1 grain of the iron salt. It is not, strictly speaking, a solution of iron lactophosphate, but of the compound iron phosphate with lactic acid. It is conveniently made and may be used for all pharmaceutical and medicinal purposes where iron lactophosphate is desired in solution.

Solution of Iron Phosphate.

Soluble Iron Phosphate, in scales,	4 $\frac{1}{8}$ ounces av.
Glycerin,	2 fl.ounces
Water, sufficient to make	8 fl.ounces

Heat 6 fl.ounces of water to boiling in an evaporating dish and add the iron salt in small portions at a time, stirring constantly, and continuing the heat until all has been added and dissolved, then add the glycerin and evaporate the liquid carefully until it measures 8 fl.ounces. This solution contains 50 percent. of the iron salt, therefore double the quantity of minims as is directed of grains in the formula may be used. It is very convenient to keep prepared in this form for general dispensing purposes, as well as for making elixirs, syrups etc.

A solution of phosphate of iron was formerly made by precipitating a solution of phosphate of sodium with a solution of sulphate of iron, washing the precipitate, draining and pressing it and dissolving it in phosphoric acid, using the same proportions and method as is directed for making solution of manganese phosphate; but the introduction of the scale salt phosphate of iron gives a much better preparation with much less trouble.

Solution Iron Pyrophosphate.

Iron Pyrophosphate,	4 $\frac{1}{3}$ ounces av.
Glycerin,	4 fl.ounces
Ammonia Water, 10 percent.,	$\frac{1}{2}$ fl.ounce
Water, sufficient to make	16 fl.ounces

In 8 fl.ounces of water heated nearly to boiling dissolve the iron pyrophosphate by adding it in small portions and stirring until dissolved, then, while cooling, add the ammonia water and the glycerin, and lastly, sufficient water to make the measure 16 fl.ounces.

This solution is very convenient to use in place of the salt, 4 minims being equivalent to 1 grain of iron pyrophosphate. Since the introduction of the soluble iron phosphate (scale salt) iron pyrophosphate is much less used than formerly.

Solution of Lactophosphates Compound.

Solution of Calcium Lactophosphate,	2 fl.ounces
Solution of Iron Lactophosphate,	1 fl.ounce

Mix them. This solution may be used in making some elixirs, syrups etc., or may be diluted with 10 parts of water and employed as a medicine, in doses of a teaspoonful or more.

Four minims of this solution represent 1 grain of the lactophosphates combined in the proportion of $\frac{2}{3}$ gr. calcium lactophosphate and $\frac{1}{3}$ iron lactophosphate.

Solution of Manganese Hypophosphite.

Manganese Hypophosphite,	480 grains
Hypophosphorus Acid, diluted,	3 fl.ounces
Water, sufficient to make	4 fl.ounces

Dissolve the manganese salt in the acid by the aid of gentle heat and add water sufficient to make the measure 4 fl.ounces.

Four minims of this solution represent 1 grain of the manganese salt.

Solution of Manganese Lactophosphate.

Solution of Manganese Phosphate,	8 fl.ounces
Concentrated Lactic Acid,	1 fl.ounce

Evaporate the solution of manganese phosphate by the aid of heat of a water-bath to 7 fl.ounces, and when cool add the lactic acid.

Four minims of this solution represent 1 grain of manganese lactophosphate.

Solution of Manganese Phosphate.

Manganese Sulphate,	5 ounces av.
Sodium Phosphate,	7 ounces av.
Phosphoric Acid, 50 percent.,	8 fl.ounces
Sugar,	5 ounces av.
Water, a sufficient quantity.	

Dissolve the manganese and sodium salts separately, each in 4 pints of warm water, and add the solution of manganese sulphate to the solution of sodium phosphate. Wash the precipitate, collect, drain and press out the water as much as possible, then dissolve the moist precipitate in the phosphoric acid, add the sugar to the solution and sufficient water to make the measure 20 fl.ounces, and filter. Use 4 minims of this solution as an equivalent of 1 grain of the salt when directed in liquid preparations.

Solution of Phosphates Compound.

"Acid Phosphate."

Solution Phosphates Compound, concentrated,	1 pint
Water,	4 pints

Mix them, and after standing filter.

This solution is similar in composition to a popular proprietary preparation known as "Acid Phosphate." Solution of phosphates compound is considerably used at the soda-water counter as an addition to beverages etc., and is a popular nerve tonic and vitalizer.

Solution of Phosphates Compound, Concentrated.

Solution of Calcium Phosphate,	12 fl.ounces
Solution of Iron Phosphate,	1 fl.ounce
Sodium Phosphate,	320 grains
Potassium Carbonate,	128 grains
Magnesium Carbonate,	128 grains
Phosphoric Acid, 50 percent.,	1 fl.ounce
Water, sufficient to make	16 fl.ounces

Mix the solution of calcium and iron phosphate, add the magnesium carbonate and potassium to the phosphoric acid, and when effervescence has ceased, add the sodium phosphate, in fine powder, and 1 ounce of warm water. Mix the two solutions and add enough water to make the measure 16 fl.ounces.

A fl.drachm of this solution contains about 12 grains calcium phosphate, 2 grains iron phosphate, $2\frac{1}{2}$ grains sodium phosphate, and 1 grain each potassium and magnesium phosphate, with excess of phosphoric acid. It is similar in composition to most of the compound elixirs, syrups and solutions of phosphates compound, and may be used for making them by diluting with elixir, syrup, water or other liquids. It is also used for making "acid phosphate" and "fruit phosphates" for soda water etc.

Solution of Potassium Citrate.

Potassium Carbonate,	8 ounces av.
Citric Acid,	6 ounces av.
Water, sufficient to make	20 fl.ounces

Dissolve the potassium carbonate in 10 fl.ounces of water and add the citric acid, a little at a time. When all has been added and effervescence ceases, add enough water to make 20 fl.ounces of the solution and filter. Use double the quantity of this solution that is directed of the salt in the formula.

Solution "Protoxide" of Iron.

A solution of iron protocitrate, which is the same as is generally furnished as "protoxide" of iron, may be made as follows:

Iron Sulphate, pure crystals,	3 ounces av.
Sodium Carbonate,	4 ounces av.
Citric Acid,	2 ounces av.
Sugar,	4 ounces av.

Warm Water, a sufficient quantity.

Dissolve the iron salt in half a gallon of warm water, and the sodium salt in half a gallon of warm water; then add the iron solution to the sodium solution. When the precipitate has subsided, wash it as directed for washing precipitates until the washings are tasteless, then add the sugar, drain the precipitate quickly, press it and dissolve it in 8 fl.ounces of water in which the citric acid has previously been dissolved; add enough water, if necessary, to make the measure 16 fl.ounces, and filter.

Four minims of this solution contain about 1 grain iron protocitrate. It is used for making several elixirs, syrups, solutions etc.

Solution of Saccharin. Solution of Gluside.

Sodium Bicarbonate,	256 grains
Saccharin or Gluside,	256 grains
Alcohol,	2 fl.ounces
Water, (boiling),	14 fl.ounces

Dissolve the sodium bicarbonate in 14 fl.ounces of boiling water and add the saccharin in portions. When effervescence ceases add the alcohol. A fl.drachm contains 2 grains of saccharin. This is a convenient solution to add to any liquid preparation or medicine as a sweetening ingredient.

Solution of Strychnine Sulphate.

For combining with elixirs, syrups, solutions, wines and like preparations, as well for general dispensing, a solution of strychnine is a great convenience, if not a necessity. The following solution is well adapted for this purpose:

Strychnine Sulphate, powdered,	32 grains
Citric Acid,	8 grains
Alcohol,	2 fl.ounces
Water, sufficient to make	4 fl.ounces

Dissolve the citric acid in 2 fl.ounces of hot water and add the strychnine salt; when nearly cool add the alcohol and filter the solution; then add sufficient water to make the measure 4 fl.ounces.

A fl.drachm of this solution contains 1 grain strychnine sulphate, therefore a fluid drachm may be used for each grain of strychnine directed in the formulæ.

Caution. This solution must only be used for combining with preparations or dispensing in place of strychnine directed in liquid preparations. Several other solutions of strychnine, containing only 1 grain in a fl.ounce, or the Br. Liquor Strychninæ, containing 1 part in 100, are known, and care must be exercised that this solution is not used instead of them.

Other Solutions.

The foregoing official solutions include most that are in general use in pharmacy, but there are many others considerably used that will appear elsewhere in this work. The following are for general use in preparing solutions of drugs for which specific formulas are not given:

Percentage Solutions.

It is often required to make solutions containing a certain percentage of the salt or medicament. The following table will be found convenient for this purpose:

To prepare a pint (16 fl.ounces) of the solution, take the designated quantity of the medicament and water sufficient to make 16 fl.ounces; smaller quantities in the same proportion.

For 1-50 p.c. or 1 in 5000 use of medicament	1½ grains
For 1-20 p.c. or 1 in 2000	3¾ grains
For 1-10 p.c. or 1 in 1000	7½ grains
For 1-4 p.c. or 1 in 400	18¼ grains
For 1-2 p.c. or 1 in 200	36½ grains
For 1 p.c. or 1 in 100	73 grains
For 2 p.c. or 1 in 50	146 grains
For 4 p.c. or 1 in 25	292 grains
For 5 p.c. or 1 in 20	365 grains
For 10 p.c. or 1 in 10	730 grains

Solution of Cocaine.

For immediate use it is only required to dissolve the specified quantity of the cocaine salt in distilled water; but it is often desirable to keep the solution on hand or for filling prescriptions. Permanent solutions may be made as follows:

Cocaine Hydrochlorate,	10 grains	20 grains
Alcohol,	60 minims	60 minims
Glycerin,	60 minims	60 minims
Distilled Water,	365 minims	365 minims

The preceding formula may be taken as a sample to follow in making other percentage solutions required to be kept on hand.

These solutions may be used externally or by hypodermic injection.

Saturated Solutions.

In making saturated solutions of most salts it is best to dissolve a little more of the salt than is soluble in cold water, by using hot water to make the solution. There will be then, when the solution is cool, a precipitate, more or less, of the salt, and the saturated solution may be poured off or filtered.

Solution Boric Acid. (Saturated).

Boric Acid, in powder, 4½ ounces
Distilled Water, sufficient to make 1 pint or 16 fl.ounces

Heat 13 fl.ounces of the water nearly to boiling and dissolve the borax in it; while cooling but still warm, add enough water to make the measure 16 fl.ounces. After standing a few hours, filter and add through the filter enough distilled water to make 16 fl.ounces.

This is a sample formula for a saturated solution that may be applied to any salt. The solubility of most salts is noted under their description throughout this work, and to make a saturated solution a little more of the salt should be taken than the percentage that will dissolve in cold water.

Solutions Hypodermic.

A general formula for hypodermic solutions is to so prepare them that the required dose of the medicament may be represented in 10 minims of the solution; for example:

Morphine Sulphate, 6 grains
Boric Acid, 5 grains
Boiling Distilled Water, 1 fl.ounce

Dissolve the salts in the boiling water and filter the solution; 10 minims represent $\frac{1}{8}$ grain of the morphine salt. The boric acid is added as a preservative when the solution is intended to keep for some time. It may be used with any solution with which a weak acid is not incompatible. Chloroform water is also a good preservative, or a few drops of formaldehyde added to a solution is effective. The following table shows the quantity of medicament to be added for making the solution of which 10 minims is to be injected:

For $\frac{1}{200}$ gr. dose, med.	$\frac{1}{4}$ gr. in water q.s. to make	500 min.
For $\frac{1}{100}$ gr. " "	$\frac{1}{2}$ gr. " "	500 min.
For $\frac{1}{50}$ gr. " "	1 gr. " "	500 min.
For $\frac{1}{40}$ gr. " "	$1\frac{1}{4}$ gr. " "	500 min.
For $\frac{1}{30}$ gr. " "	$1\frac{2}{3}$ gr. " "	500 min.
For $\frac{1}{25}$ gr. " "	2 gr. " "	500 min.
For $\frac{1}{20}$ gr. " "	$2\frac{1}{2}$ gr. " "	500 min.

For $\frac{1}{10}$	gr.	dose, med.	5	gr.	in water q.s. to make	500 min.
For $\frac{1}{8}$	gr.	" "	6	gr.	" "	480 min.
For $\frac{1}{6}$	gr.	" "	8	gr.	" "	480 min.
For $\frac{1}{5}$	gr.	" "	10	gr.	" "	500 min.
For $\frac{1}{4}$	gr.	" "	12	gr.	" "	480 min.
For $\frac{1}{3}$	gr.	" "	16	gr.	" "	480 min.
For $\frac{1}{2}$	gr.	" "	24	gr.	" "	480 min.
For I	gr.	" "	48	gr.	" "	480 min.

Tables of medicaments most used are furnished by manufacturers for convenient extemporaneous use.

A few formulas for solutions for hypodermic injections are official in the Br. and Mex. pharmacopœias under the heading *Injectio Hypodermica*, (which see), and several in the French Codex under the heading *Solutés pour Injections Hypodermique*, but as Hypodermic Tablets are generally used they are not given here.

SOLUTOL AND SOLVEOL.

These are neutral solutions prepared by adding solution of soda or potassa to crude cresol. They are blackish-brown fluids similar to creolin, and contain from 25 to 50 percent. of cresol.

SOMATOSE.

This is a semi-proprietary name for a preparation, in powder form, consisting of the nutrient properties of meat which has been converted into soluble albuminoses. It is given in weakened digestion and debility, $\frac{1}{2}$ to 1 ounce, daily, in milk or soup.

SOMNOFORM.

This is a mixture of ethyl chloride 60 parts, methyl chloride 35 parts and ethyl bromide 5 parts. It is used chiefly as a local anesthetic in dentistry.

SPECIES — TEAS.

Under this heading the German and some other pharmacopœias direct a variety of mixtures of cut drugs, such as herbs, flowers, barks, roots, woods, leaves etc., which are designed to be steeped in water and the liquid given as a drink, or used dry as pillows, or moistened as cataplasms etc. Several similar preparations have been put upon the market as proprietary remedies and have been quite popular as laxatives, worm teas etc. The following are official in the leading pharmacopœias, others will be found among the Standard Remedies.

Species Amarae. Bitter Tea. This is official in several foreign pharmacopœias, the formulas varying somewhat; the following formula may be considered typical: Italian.—Orange peel, blessed thistle, centaury, each 2 parts; buckbean leaves, gentian, each 1 part.

Species Aromaticæ. P. G. Peppermint, wild thyme, garden thyme, lavender flowers, each 2 ounces or parts; cloves, cubeb, each 1 part. Cut and mix them. This is used dry for filling pillows and scent bags, or may be steeped if desired.

Species Carminativæ. Fr. Anise fruit, coriander fruit, bruised; fennel fruit, of each, equal parts.

Species Diureticæ. P. G. This is official in several foreign pharmacopœias. The German formula is as follows: Juniper berries, liquorice root, angelica root, radix ononidis, each 1 part.

Species Emollientes. Emollient Cataplasm. Althæa leaves, mallow leaves, melliot, matricaria, flaxseed, each, equal parts. This is made into a poultice for pains, sores, swellings etc.

Species Laxantes. Laxative Tea. St. Germain Tea. Senna leaves, cut moderately fine, 160 parts; elder flowers 100 parts, fennel, crushed, 50 parts; anise, crushed, 50 parts; potassium tartrate 25 parts, alcohol 15 parts. The fennel and anise are first intimately mixed with the potassium tartrate dissolved in 50 parts of water, and, after standing half an hour, with the alcohol mixed with 15 parts of water, for the purpose of uniform saturation. The mixture is then dried by moderate heat with the remaining ingredients.

Species Ligorum. Wood Tea. Guaiacum wood 5 parts, rest-harrow root 3 parts, Russian liquorice root, sassafras wood, each 1 part. Cut them and mix.

Species Pectorales. Pectoral Tea. Althæa, (flowers), 8 parts; Russian liquorice root 3 parts, orris root 1 part, coltsfoot 4 parts, mullein flowers 2 parts, anise 2 parts. Cut and mix them. This is the most popular of the teas, being much used by the Germans for colds, influenzas and other similar indispositions. A cup of boiling water is poured upon a tablespoonful of the tea and the infusion drunk while warm. This is commonly known as **Brustthee** or Breast tea.

SPIRITI — SPIRITUOSA — SPIRITS.

As understood in pharmacy, spirits are solutions of volatile substances in alcoholic, or hydro-alcoholic liquids, made either by distillation or solution. They include solutions of volatile oils, ethers, gases and other substances. Commercially spirits are understood to be alcohol, or alcoholic spirits, made by distillation and known as liquors or spiritous liquors.

Many liquors familiarly known as "spirits" are classed in pharmacy under other headings, and many of the spiritous liquors are included among the spirits in pharmacy; some of the spirits are also familiarly known as essences, extracts etc.

The following are the spirits official in the U. S. and Br. pharmacopœias:

SPIRITUS ÆTHERIS. U. S., Br. Spirit of Ether.

The U. S. preparation is made by mixing

Stronger Ether,	325 Cc. or 11 fl.ounces
Alcohol,	675 Cc. or 22 $\frac{7}{8}$ fl.ounces
To make	1000 Cc. or 33 $\frac{7}{8}$ fl.ounces

Average dose.—4 Cc. (1 fl.drachm).

The Br. preparation is:

Ether,	500 Cc. or 10 fl.ounces
Alcohol, (90%),	1000 Cc. or 20 fl.ounces

Mix. Sp. gr. 0.806 to 0.811.

Dose, 20 to 40 minims for repeated administration; for a single administration 60 to 90 minims.

SPIRITUS ÆTHERIS NITROSI. U. S., Br.

Spirit of Nitrous Ether. Sweet Spirit of Nitre.

"An alcoholic solution of Ethyl Nitrite [$\text{NO} \cdot \text{OC}_2\text{H}_5 = 74.51$], yielding, when freshly prepared and tested by the process given, not less than 4 percent. of ethyl nitrite." < U. S.

The U. S. P. formula is:

Sodium Nitrite,	100	Gm. or	10 ounces av.
Sulphuric Acid,	40	Cc. or	4 fl.ounces
Monohydrated Sodium Carbonate,	0.6	Gm. or	27 grains
Potassium Carbonate, dried,	3	Gm. or	131 grains
Alcohol,			

Water, each, a sufficient quantity.

"Mix the sulphuric acid with 120 Cc. (or 12 fl.ounces) of water, cool the liquid, add 85 Cc. (or $8\frac{1}{2}$ fl.ounces) of alcohol previously diluted with an equal volume of water, and introduce the solution into a 1000 Cc. flask, surrounded by a mixture of ice and water. Dissolve the sodium nitrite in 280 Cc. (or 28 fl.ounces) of water, filter, and having poured the filtrate into a separatory funnel, allow the liquid to slowly drop into the flask containing the acid mixture. When all has been added and the reaction is complete, allow any crystals which may have formed to settle at the bottom of the flask, and decant the cold mixture of ethyl nitrite and aqueous solution quickly to the previously cleaned separatory funnel and draw off and discard the aqueous liquid. Wash the separated ethyl nitrite, first with 20 Cc. (or 2 ounces) of ice-cold water and then remove any traces of acid by washing it with 15 Cc. (or $1\frac{1}{2}$ ounces) of ice-cold water in which the monohydrated sodium carbonate has previously been dissolved. Carefully separate the ethyl nitrite from the aqueous liquid, and agitate it in a well-stoppered vial with the potassium carbonate to remove traces of water. Then cool the liquid, decant and pour the ethyl nitrite immediately into a tared bottle containing 500 Gm. (or 50 ounces av.) of alcohol. Ascertain the weight of the ethyl nitrite poured into the alcohol by noting the increase of weight of the tared bottle and contents, and then add enough alcohol to make the mixture weigh 22 times the weight of the ethyl nitrite added. Lastly, transfer the product to small, well-stoppered, dark amber-colored vials, and keep these in a cool place, remote from lights or fire." < U. S.

The Br. P. process for preparing this spirit is entirely different. Nitric acid, sulphuric acid, copper, and alcohol, 90 percent., being used, and the mixture distilled and the product so adjusted that it will contain $2\frac{1}{2}$ percent. of ethyl nitrite when tested by the Br. method, while the U. S. preparation contains 4 percent.

This spirit is now seldom prepared except by manufacturing chemists, although the present U. S. P. formula is not difficult to

manipulate. The sp. gr. of the U. S. spirit is about 0.823 at 25°C. (77°F.).

Uses. Spirit of nitrous ether is much used as a diuretic and diaphoretic combined with other remedies.

Average dose.—2 Cc. (30 minims).

CONCENTRATED NITROUS ETHER.

This preparation is now almost altogether used by druggists for preparing Spirit of Nitrous Ether. It is put up by manufacturing chemists.

Ethyl Nitrite,

90 parts or 432 minims

Alcohol,

10 parts or 48 minims

This preparation as furnished to the trade is in sealed glass tubes, one of which, when added to 16 fl.ounces of alcohol will produce a little more than a pint of Spirit of Nitrous Ether, containing 4 percent. of Ethyl Nitrite.

One of the great advantages of this preparation is that only a small quantity of Spirit of Nitrous Ether need be made at a time, and this does not get acid, as was frequently the case when large quantities were bought as was formerly the custom.

SPIRITUS ÆTHERIS COMPOSITUS. U. S., Br.

Compound Spirit of Ether. Hoffmann's Anodyne.

The U. S. formula is:

Ether,

325 Cc. or 11 fl.ounces

Alcohol,

650 Cc. or 22 fl.ounces

Etherial Oil,

25 Cc. or 7 fl.drachms

Mix them.

The Br. formula amounts to the same, the etherial oil being prepared as it is directed to be made in the formula, as it is not official in the Br. P.

This is used as an anodyne and hypnotic, being generally called for as Hoffmann's Anodyne, or Hoffmann's Drops.

Average dose.—4 Cc. (1 fl.drachm).

SPIRITUS AMMONIÆ. U. S. Spirit of Ammonia.

"An alcoholic solution of Ammonia [$\text{NH}_3=16.93$] containing 10 percent., by weight, of the gas. This solution deteriorates on keeping, and should be tested frequently. It must not be dispensed for medicinal purposes if it contains less than 10 percent. of gaseous ammonia." <U. S.

Stronger Ammonia Water,

250 Cc. or 8 fl.ounces

Alcohol, recently distilled, and after distillation

kept in glass, a sufficient quantity.

"Pour the stronger ammonia water into a flask provided with a safety funnel, and connected by means of a glass condenser, with a well-cooled receiver containing 500 Cc. (or 16 fl.ounces) of alcohol, the delivery tube of the condenser reaching nearly to the bottom of the receiver. Heat the flask carefully, and very gradually, to a temperature not exceeding 60°C. (140°F.), and maintain it at that temperature until ammonia ceases to be evolved. Then disconnect the receiver, and, having ascertained the strength of a portion of the contents by the method of assay given, add enough alcohol to make the product contains ten percent., by weight, of ammonia gas. Keep the spirit in glass-stoppered bottles, in a cool place." <U. S.

This is a colorless liquid having a strong odor of ammonia and a sp. gr. of about 0.808 at 25°C. (77°F.).

Uses. This spirit was formerly considerably used as a stimulant and antacid but is now seldom prescribed. It has no special advantages over ammonia water, except as a quick stimulant, and when that is required aromatic spirit of ammonia is generally prescribed.

Average dose.—1 Cc. (15 minims).

SPIRITUS AMMONII ANISATUS.

Anisated Spirit of Ammonia.

This is official in most all of the European pharmacopœias under different titles. **Liquor Ammonii Anisatus**, P. G., is:

Oil of Anise,	1 part
Alcohol,	24 parts
Ammonia Water,	5 parts

Dissolve the oil of anise in the alcohol and add the ammonia water.

Solutio Ammoniæ Spirituosa Anisata of the Nedl. P. is alcohol 76 parts, ammonia water 20 parts, oil of anise 4 parts.

Spiritus Ammonii Anisatus of the Swiss P. is oil of anise 3 parts, alcohol 77 parts, ammonia water 20 parts.

The formulas in other pharmacopœias are similar, varying only slightly in proportion of the ingredients. This is used for the same purposes and in the same manner as Aromatic Spirit of Ammonia of the U. S. P.

SPIRITUS AMMONIÆ AROMATICUS. U. S., Br.

Aromatic Spirit of Ammonia.

The U. S. formula is:

Ammonium Carbonate,	34 Gm. or	1½ ounces av.
Ammonia Water,	90 Cc. or	3 fl.ounces
Oil of Lemon,	10 Cc. or	160 minims
Oil of Lavender Flowers,	1 Cc. or	16 minims
Oil of Myristica,	1 Cc. or	16 minims
Alcohol,	700 Cc. or	23¾ fl.ounces
Distilled Water, to make	1000 Cc. or	33¾ fl.ounces

"To the ammonia water contained in a flask add 140 Cc. (or $4\frac{3}{4}$ fl.ounces) of distilled water, and afterwards the ammonium carbonate reduced to a moderately fine powder. Close the flask and agitate the contents until the carbonate is dissolved, and allow to stand for 12 hours. Introduce the alcohol into a graduated bottle of suitable capacity, add first the oils, then gradually enough distilled water to make the product measure 1000 Cc. (or $33\frac{7}{8}$ fl.ounces). Set the liquid aside during 24 hours in a cool place, filter through paper in a well-covered funnel." < U. S.

The Br. P. directs this to be made by distillation of the oils with rectified spirit and water, and then adding the carbonate and ammonia solution. The formula is as follows:

Ammonium Carbonate,	100	Gm. or	4	ounces av.
Strong Ammonia Solution,	200	Cc. or	8	fl.ounces
Oil of Nutmeg,	14.1	Cc. or	$4\frac{1}{2}$	fl.drachms
Oil of Lemon,	20.3	Cc. or	$6\frac{1}{2}$	fl.drachms
Alcohol, (90%),	3000	Cc. or	120	fl.ounces
Distilled Water,	1500	Cc. or	60	fl.ounces

"Place the oils of lemon and nutmeg and alcohol with the water in a retort; distil 7 Imp. pints (140 fl.ounces, or 3500 Cc.), and then distil and separately collect an additional 9 fl.ounces (or 225 Cc.). Place the latter together with the ammonium carbonate and the strong solution of ammonia in a bottle holding rather more than a pint (20 fl.ounces), or rather more than half a litre. Securely cork the bottle and gently warm it in a water-bath to 140°F. (60°C.), shaking it from time to time until all the salt is dissolved. Filter when cold through cotton-wool, and gradually mix with it the portion first distilled." < Br.

This is nearly colorless when first prepared, but gradually acquires a somewhat darker tint. Its sp. gr. is 0.900 at 25°C. (77°F.).

Uses. Aromatic spirit of ammonia is used as a quick stimulant and diaphoretic in doses of 20 to 60 minims. It is given for syncope, headache and prostration from any cause, and is a valuable addition to cough remedies.

Average dose.—2 Cc. (30 minims).

SPIRITUS AMMONIÆ FÆTIDUS. Br.

Fetid Spirit of Ammonia.

Asafetida,	75	Gm. or	$1\frac{1}{2}$	ounces av.
Strong Ammonia Solution,	100	Cc. or	2	fl.ounces
Alcohol, (90%),	a sufficiency.			

"Break the asafetida into small pieces and macerate it in a closed vessel in 15 fl.ounces (or 750 Cc.) of the alcohol for 24 hours; then distil off the spirit, mix the distillate with strong solution of ammonia and add sufficient spirit to make 20 fl.ounces (or 1000 Cc.)." < Br.

Uses. This is given as an antispasmodic and stimulant in doses of 60 to 90 minims.

SPIRITUS AMYGDALÆ AMARÆ. U. S.

Spirit of Bitter Almond.

Oil of Bitter Almond, 10 Cc. or 1 fl.drachm

Alcohol, 800 Cc. or 10 fl.ounces

Distilled Water, a sufficient quantity.

The oil is to be dissolved in the alcohol and enough distilled water added to make 1000 Cc. (or 12½ fl.ounces). It contains 1 percent., by volume, of the essential oil. <U. S.

Average dose.—0.5 Cc. (8 minims).

SPIRITUS ANISI. U. S., Br. Spirit of Anise.

The U. S. formula is:

Oil of Anise, 100 Cc. or 1 fl.ounce

Alcohol, 900 Cc. or 9 fl.ounces

Mix them. Average dose.—4 Cc. (1 fl.drachm).

The Br. formula is:

Oil of Anise, 50 Cc. or 1 fl.ounce

Alcohol, (90%), a sufficient quantity.

To the oil of anise add sufficient alcohol to make 500 Cc. (or 10 fl.ounces).

Uses. This is familiarly known as Essence of Anise, and is considerably used as an addition to carminative mixtures, as an aromatic. The dose is 5 to 20 minims or more.

SPIRITUS ARMORACIÆ COMPOSITUS. Br.

Compound Spirit of Horseradish.

Horseradish Root, scraped, 125 Gm. or 5 ounces av.

Bitter Orange Peel, bruised, 125 Gm. or 5 ounces av.

Nutmeg, bruised, 3.15 Gm. or 55 grains

Alcohol, (90%), 625 Cc. or 25 fl.ounces

Water, 750 Cc. or 30 fl.ounces

Mix them and distil 40 fl.ounces (or 1000 Cc.).

This is used as an aromatic stomachic. Dose, 1 to 2 fl.drachms.

SPIRITUS AURANTII COMPOSITUS. U. S.

Compound Spirit of Orange.

Oil of Orange Peel, 200 Cc. or 4 fl.ounces

Oil of Lemon, 50 Cc. or 1 fl.ounce

Oil of Coriander, 20 Cc. or 96 minims

Oil of Anise, 5 Cc. or 24 minims

Deodorized Alcohol, to make 1000 Cc. or 20 fl.ounces

Mix and keep the mixture in small, well-stoppered bottles, in a cool place.

Care must be taken to use fresh oil of orange and lemon which has no odor of turpentine.

Uses. This is used chiefly as a flavoring for elixirs and aromatic syrups.

SPIRITUS CAJUPUTI. Br. Spirit of Cajuput.

Oil of Cajuput, 50 Cc. or 1 fl.ounce

Alcohol, (90%), a sufficient quantity.

To the oil of cajuput add sufficient alcohol to form 500 Cc. (or 10 fl.ounces).

This is given as a stimulant in doses of 5 to 20 minims.

SPIRITUS CAMPHORÆ. U. S., Br. Spirit of Camphor.

The U. S. formula is:

Camphor, 100 Gm. or 3¼ ounces av.

Alcohol, sufficient to make 1000 Cc. or 33 fl.ounces

Dissolve the camphor in 800 Cc. (or 25 fl.ounces) of the alcohol and filter, then add enough alcohol to make the measure 1000 Cc. (or 33 fl.ounces).

The Br. formula is:

Camphor, 50 Gm. or 1 ounce av.

Alcohol, (90%), a sufficient quantity.

To the camphor add enough alcohol to form 10 fl.ounces (or 500 Cc.) of the spirit of camphor.

Uses. Spirit of camphor is extensively used in liniments and other similar preparations in which it is obvious that the addition of water in the formula is inexpedient. In medicine it is used for pain, swellings, rheumatic affections and in fact for nearly everything, both externally and internally.

Average dose.—1 Cc. (15 minims).

SPIRITUS CHLOROFORMI. U. S., Br.

Spirit of Chloroform. Chloric Ether. Spirit of Chloric Ether.

The U. S. formula is:

Chloroform, 60 Cc. or 2 fl.ounces

Alcohol, 940 Cc. or 31⅓ fl.ounces

Mix them. It contains 6 percent., by measure, or nearly 10 percent., by weight, of chloroform. Average dose.—2 Cc. (30 minims).

The Br. P. formula is:

Chloroform, 1 fl.ounce or 50 Cc.

Alcohol, (90%), a sufficient quantity.

To the chloroform add enough of the alcohol to form 20 fl.ounces (or 1000 Cc.) of the spirit of chloroform. Dose, 30 to 40 minims.

Uses. Spirit of chloroform is often prescribed and dispensed as Chloric Ether. It is used externally and internally as an anodyne and relaxative.

SPIRITUS CINNAMOMI. U. S., Br. Spirit of Cinnamon.

The U. S. formula is:

Oil of Cinnamon,	100 Cc. or 1 fl.ounce
Alcohol,	900 Cc. or 9 fl.ounces

Mix them. Average dose.—2 Cc. (30 minims).

The Br. P. formula is:

Oil of Cinnamon,	50 Cc. or 1 fl.ounce
Alcohol, (90%),	a sufficient quantity.

To the oil of cinnamon add enough of the alcohol to form 20 fl.ounces (or 1000 Cc.) of the spirit of cinnamon. Dose, 5 to 20 minims.

Uses. Spirit of cinnamon is used as a flavoring ingredient for many preparations, and is given as a quick stimulant in doses of 20 to 60 minims. It is familiarly known as essence of cinnamon.

SPIRITUS FRUMENTI. U. S. Whisky.

"An alcoholic liquid obtained by the distillation of the mash of fermented grain—such as Indian corn, rye, wheat and barley, or their mixtures." <U. S.

The whisky designated in the U. S. P. should be at least four years old. Its sp. gr. should not be more than 0.945 nor less than 0.924 at 15.6°C. (60°F.), corresponding approximately to an alcoholic percentage of 37 to 47.5 percent., by weight, or 44 to 55 percent., by volume, of absolute alcohol.

SPIRITUS GAULTHERIÆ. U. S.

Spirit of Gaultheria. Essence of Wintergreen.

Oil of Gaultheria, (Wintergreen),	50 Cc. or 1 fl.ounce
Alcohol,	950 Cc. or 19 fl.ounces

Mix them. Average dose.—2 Cc. (30 minims).

This is a weak solution of the oil corresponding with the strength of similar British spirits. To make essence of wintergreen 1 ounce of the oil should be dissolved in 15 ounces of alcohol. See Essences.

SPIRITUS GLYCERYLIS NITRATIS. U. S.

Spirit of Glyceryl Trinitrate. Spirit of Nitroglycerin.

[*Spiritus Glonoini*, Pharm. 1890].

"An alcoholic solution containing 1 percent., by weight, of Glyceryl Trinitrate [$C_3H_5(O.NO_2)_3=225.44$]. Spirit of nitroglycerin should be kept and transported in well-stoppered tin cans, and should be stored in a cool place, remote from lights or fire." <U. S.

Caution in handling this spirit should be observed.

"Sp. gr. 0.814 to 0.820 at 25°C. (77°F.). If the sp. gr. of the spirit is higher than 0.830 at 25°C. (77°F.), or if 10 Cc. of it be rendered turbid by less than 10 Cc. of water, the spirit should be rejected." <U. S.

Used as a heart stimulant. Average dose.—0.05 Cc. (1 minim).

SPIRITUS JUNIPERI. U. S. Spirit of Juniper.

The U. S. formula is:

Oil of Juniper,	50 Cc. or 1 fl.ounce
Alcohol,	950 Cc. or 19 fl.ounces

Mix them. Average dose.—2 Cc. (30 minims).

The liquor called gin is often prescribed under the name "spiritus juniperi," but is entirely unlike this preparation.

The Br. formula directs oil of juniper 1 fl.ounce (or 50 Cc.), alcohol, (90%), a sufficient quantity to make 10 fl.ounces (or 500 Cc.).

Uses. Spirit of juniper is used as a stimulating diuretic, and for mixtures.

SPIRITUS JUNIPERI COMPOSITUS. U. S.**Compound Spirit of Juniper.**

Oil of Juniper,	8 Cc. or 16 minims
Oil of Caraway,	1 Cc. or 2 minims
Oil of Fennel,	1 Cc. or 2 minims
Alcohol,	1400 Cc. or 6 fl.ounces
Water, sufficient to make	2000 Cc. or 8½ fl.ounces

Dissolve the oils in the alcohol, add the water, mix and filter. This is given as a stimulant and diuretic.

Average dose.—8 Cc. (2 fl.drachms).

SPIRITUS LAVENDULÆ. U. S., Br. Spirit of Lavender.

The U. S. formula is:

Oil of Lavender Flowers,	50 Cc. or 1 ounce
Alcohol,	950 Cc. or 19 fl.ounces

Mix them. Average dose.—2 Cc. (30 minims).

The Br. P. formula directs 1 fl.ounce (or 50 Cc.) of oil of lavender to be dissolved in sufficient alcohol to form 10 fl.ounces (or 500 Cc.) of spirit of lavender. Dose, 5 to 15 minims.

Uses. Spirit of lavender is given as an aromatic stimulant and stomachic in doses of 20 to 60 minims.

SPIRITUS MENTHÆ PIPERITÆ. U. S., Br.**Spirit of Peppermint. Essence of Peppermint.**

The U. S. formula is:

Oil of Peppermint,	100 Cc. or 2 fl.ounces
Peppermint, bruised,	10 Gm. or 93 grains
Alcohol, sufficient to make	1000 Cc. or 20 fl.ounces

"Dissolve the oil of peppermint in 900 Cc. (or 18 ounces) of the alcohol, add the peppermint and allow it to macerate for 24 hours. Then filter through paper and add through the filter enough alcohol to make the spirit measure 1000 Cc. (or 20 fl.ounces)." <U. S.

The Br. P. directs 1 fl.ounce (or 50 Cc.) of oil of peppermint to be dissolved in a sufficient quantity of alcohol (90%), to form 10 fl.

ounces (or 500 Cc.) of spirit of peppermint. Dose, 5 to 20 minims.

Essence of Peppermint is usually made with oil of peppermint 1 ounce, alcohol 15 ounces. (See Essences).

Uses. This essence is extensively used as a household remedy for flatulence, colic etc. The dose is 10 to 60 drops.

SPIRITUS MENTHÆ VIRIDIS. U. S.

Spirit of Spearmint. Essence of Spearmint.

Oil of Spearmint,	100 Cc. or 2 fl.ounces
Spearmint, bruised,	10 Gm. or 93 grains
Alcohol, sufficient to make	1000 Cc. or 20 fl.ounces

Make in the same manner as the foregoing.

Uses. This is used for similar purposes as essence of peppermint. Average dose.—2 Cc. (30 minims).

SPIRIT OF MYRCIÆ. Spirit of Myrcia. Bay Rum.

This was official in the 7th revision of the U. S. P. but has been dismissed.

Oil of Myrcia,	16 Cc. or 1 fl.ounce
Oil of Orange Peel,	1 Cc. or 30 minims
Oil of Pimenta,	1 Cc. or 30 minims
Alcohol,	1220 Cc. or 81 fl.ounces
Water, sufficient to make	2000 Cc. or 125 fl.ounces

Mix the oils with the alcohol and gradually add the water to the solution until it measures 2000 Cc. (or 125 fl.ounces). Set the mixture aside in a well-stoppered bottle for 8 days, then filter through paper in a well-wetted funnel. Other formulas for Bay Rum which may be preferred to this will be found among Toilet Preparations.

SPIRITUS MYRISTICÆ. Br. Spirit of Nutmeg.

This was official in the U. S. P. 7th revision, but has been dismissed. The Br. formula is:

Oil of Nutmeg,	1 fl.ounce or 50 Cc.
Alcohol, (90%), a sufficient quantity.	

To the oil of nutmeg add sufficient of the alcohol to make 10 fl.ounces (or 500 Cc.) of the spirit of nutmeg. If the solution be not clear agitate with a little powdered talc and filter. Dose, 5 to 10 minims.

As **Essence of Nutmeg** this spirit is considerably used for flavoring.

SPIRITUS RECTIFICATUS. Br. Alcohol (90 percent).

Rectified Spirit.

"A liquid containing 90 parts by volume of ethyl hydroxide C_2H_5OH , and 10 parts by volume of water; obtained by the distillation of fermented saccharine liquids." <Br.

Previous to the 1898 Br. pharmacopœia, alcohol commonly used in pharmacy was known as rectified spirit, and diluted alcohol as proof spirit; but now this classification is done away with and rectified spirit is designated in formulas as alcohol (90%), and diluted alcohol is of four different percentages which are designated in formulas as alcohol (70%), alcohol (60%), alcohol (45%), alcohol (20%).

By referring to the article on alcohol, a table will be found which shows at a glance the quantity of alcohol of the U. S. standard, and the quantity of water required to be mixed to produce the Br. P. alcohols of the percentages named.

SPIRITUS ROSEMARINI. Br. Spirit of Rosemary.

Oil of Rosemary,	50 Cc. or 1 fl.ounce
Alcohol, (90%),	500 Cc. or 10 fl.ounces

To the oil of rosemary add enough of the alcohol to form 10 fl.ounces (or 500 Cc.) of spirit of rosemary.

An aromatic stimulant. Dose, 20 to 60 minims.

SPIRITUS VINI GALLACI. U. S., Br. Brandy.

"An alcoholic liquid obtained by the distillation of fermented, unmodified juice of fresh grapes, and at least four years old." <U. S.

"A spiritous liquid distilled from wine and matured by age, and containing not less than 36½ percent., by weight, or 43½ percent., by volume, of ethyl hydroxide." <Br.

Other Spirits.

Besides the official spirits named, Alcohol, Diluted Alcohol, and spirits of various strengths are noted under the heading "Alcohol." The Alcoolats of French pharmacy, the Alcoholatos of Mexican pharmacy and the Alcohols of Spanish pharmacy, which correspond with the spirits are noticed elsewhere in this work. Many of the preparations used in perfumes, and also spiritous liquors are classed as spirits. A few only of those most popular in medicine which have not been mentioned, are noticed here.

Spirit of Angelica Compound. P. G. This is made by macerating angelica root 16 parts, valerian 4 parts, and juniper berries 4 parts, cut and bruised, in alcohol 75 parts, water 125 parts, for 24 hours, then distilling off 100 parts and dissolving in the distillate camphor 2 parts. This is an aromatic stimulant and may be given in doses of ½ to 1 teaspoonful or more.

Spirit of Balm Compound. P. G. Balm leaves 14 parts, lemon peel 12 parts, nutmeg 6 parts, cinnamon, cloves, each, 3 parts; are bruised and distilled with water 250 parts, alcohol 150 parts, recovering of the distillate 200 parts. This is a fragrant spirit used for flavoring medicines etc.

Spirit of Bryony Compound. Bryony 8 ounces, valerian 2 ounces, pennyroyal 3 ounces, rue 3 ounces, mugwort, feverfew, savin, each, ½ ounce; orange peel, lovage seed, each, 1 ounce; brandy 10 pints. Macerate and distil.

Spirit of Cochlearia. Spirit of Scurvy Grass. P. G. Dried cochlearia 4 parts, powdered white mustard seed 1 part, water 40 parts. Leave standing in a retort for 3 hours, then mix with alcohol 20 parts and distil over 20 parts.

Spirit Fioravanti. Swiss turpentine 5 ounces, elemi, tacamahaca, amber, liquid storax, galbanum, myrrh, bayberries, each, 1 ounce; aloes, galangal root, ginger, zedary, cinnamon, cloves, nutmeg, cretum marium leaves, each, ½ ounce; alcohol 2 pints. Macerate 6 days and distil 25 fl.ounces. This is also known as Balsam Fioravanti, and is used for bruises, "black and blue" spots etc,

Spirit of Formic Acid. P. G. Alcohol 35 parts, water 13 parts, formic acid 2 parts. Mix them. This is also called Spirit of Ants.

Spirit of Honey Compound. Honey 32 parts, coriander 32 parts, lemon peel, fresh, 4 parts; cloves 3 parts, nutmeg, benzoin, storax, each, 2 parts; vanilla 1 part, rose water 20 parts, orange flower water 20 parts, alcohol 200 parts. Macerate for 3 days and distil all the spiritous parts. This is a fine aromatic for adding to other preparations or the toilet.

Spirit of Mastic Compound. Mastic, myrrh, olibanum, each, 1 ounce; rectified spirit 20 ounces. Macerate and distil. This is used as an application for bruises, lameness etc.

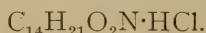
Spirit of Mustard. P. G. Volatile oil of mustard 1 part, alcohol 49 parts. Mix and dissolve. A rubefacient and quick stimulant. It is given in doses of 10 to 60 minims.

Spirit Pyroacetic. Acetone. C_3H_6O . This is an inflammable volatile liquid obtained by subjecting lead acetate or other mineral acetates to dry distillation. The acetates are first dried to make them anhydrous and then distilled with increased heat until all the volatile portions have passed over. The receiver contains crude acetone, which is purified by various means. It is also obtained as a by-product in the manufacture of aniline and some other substances. It is a solvent for resins and oils. See page 330.

Spirit Pyroxylic. Wood Naphtha. Wood Spirit. This is another name for methylic alcohol, which is obtained from crude pyrolygneous acid by distillation and subsequent treatment. It was once employed considerably in medicine under the name of Hasting's Wood Naphtha. See page 410.

Vulnerary Spirit. Dried sage, wormwood, fennel, hyssop, marjoram, savory, thyme, rosemary, calamint, balm, peppermint, scordium, fresh leaves of angelica, basil and lavender flowers, each, 2 ounces; proof spirit 10 pints. Digest 14 days and distil over 7 pints. This is a stimulant and vulnerary much used on the Continent as a cordial and stomachic.

STOVAINE. Amylene Hydrochloride.



In small shining scales, freely soluble in water or alcohol. It is used as a local anesthetic and is only about one-third as toxic as cocaine. It is generally used in solution of from 1 to 4 percent. for delicate organs and from 5 to 10 percent. on mucous membranes. Internally in doses of $\frac{1}{30}$ grain.

STRAMONIUM. U. S. Stramonium. [Thornapple].

Stramonii Folia. Br. Stramonium Leaves.

"The dried leaves of *Datura Stramonium*, Linné (Fam. Solanaceæ), yielding, when assayed by the process given, not less than 0.35 percent. of mydriatic alkaloids." <U. S.

An assay process is given in the U. S. P. which is identical with the process given for the assay of belladonna leaves, using 10 grammes of stramonium in No. 60 powder.

Uses. Stramonium leaves are employed in medicine in form of asthma powder, used by burning and inhaling the smoke. An extract, fluidextract and tincture are also prepared, and an ointment for external use. Preparations of stramonium are recommended as a remedy for mania, epilepsy, neuralgia, spasmodic asthma etc.

STRONTIUM.

Symbol Sr; Atomic weight 87.63; Sp. gr. 2.54.

A metallic element discovered by Sir H. Davy in 1808, similar in its characteristics to barium, but having less metallic luster.

Its salts are chiefly used in pyrotechnics for making red fire, and are now somewhat employed in medicine.

This element and its salts are more fully described in the Chemical Section of this work, Part I.

STRONTII BROMIDUM. U. S. Strontium Bromide.

"It should contain not less than 97 percent. of pure Strontium Bromide, and should be kept in glass-stoppered bottles." < U. S.

This salt has lately come into prominence in the treatment of epilepsy, and some forms of nervous diseases. It is prescribed in doses of 5 to 15 grains. It is soluble in 1 part of water at 25°C. (77°F.), and in 0.5 part of boiling water. It is also soluble in alcohol.

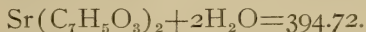
Average dose.—1 Gm. (15 grains).

STRONTII IODIDUM. U. S. Strontium Iodide.

"It should contain not less than 98 percent. of pure Strontium Iodide, and should be kept in small, glass-stoppered vials, carefully protected from light." < U. S.

This salt has also lately come into use for the treatment of albuminuria, rheumatism etc. The dose is from 3 to 10 grains. It is soluble in 0.5 part of water at 25°C. (77°F.), and in 0.27 part of boiling water. It is also soluble in alcohol.

Average dose.—0.500 Gm.=500 milligrammes (7½ grains).

STRONTII SALICYLAS. U. S. Strontium Salicylate.

"It should contain not less than 98.5 percent. of pure Strontium Salicylate $[(\text{C}_6\text{H}_4 \cdot \text{OH} \cdot \text{COO})_2\text{Sr} + 2\text{H}_2\text{O}]$, and should be kept in well-stoppered bottles, protected from heat and light." < U. S.

This is a white crystalline, odorless powder, soluble in 18 parts of water and in 66 parts of alcohol at 25°C. (77°F.).

Uses. It has been highly recommended in the treatment of rheumatism.

Average dose.—1 Gm. (15 grains).

Other Strontium Salts.

The foregoing salts of strontium official in the U. S. P. are all that are used to any extent in medicine, except perhaps Strontium Lactate,

which was official in the 7th revision of the U. S. P. but dismissed in the 8th. A number of other salts of strontium are however used in pyrotechnics, and are described under the title Strontium in the Chemical Section, Part I.

STROPHANTHINUM. U. S. Strophanthin.

"A glucoside, or a mixture of glucosides, obtained from *Strophanthus*. It should be kept in well-stoppered, amber-colored vials." <U. S.

This principle has been obtained from *Strophanthus* seeds and seems to represent their activity. The French Codex gives its chemical formula $C_{31}H_{48}O_{12}$, but manufacturing chemists vary considerably, probably from difference in their methods of preparation.

It causes paralysis of the respiratory and voluntary muscles, and lowers the frequency of the pulse at the same time increasing its volume and force. It is employed as a diuretic and a remedy for cardiac dropsy. It is generally administered hypodermically.

Average dose.—0.0003 Gm.=0.3 milligramme ($\frac{1}{200}$ grain).

STRYCHNINA. U. S., Br. Strychnine.



"An alkaloid obtained from *Nux Vomica*, and also obtainable from other plants of the *Loganiaceæ*." <U. S.

"An alkaloid obtained from the dried ripe seeds of *Strychnos Nux Vomica*, Linn., and other species of *strychnos*." <Br.

No formula for preparing this alkaloid is given in the U. S. or Br. pharmacopœias, but the 1885 Br. P. gave the following which we have adapted for water-bath percolation:

Nux Vomica, in fine powder,	16 ounces av.
Lead Acetate,	180 grains
Solution (water) of Ammonia,	
Rectified Spirit, (Alcohol 90%),	
Distilled Water, of each, a sufficient quantity.	

Macerate the powder for 12 hours with a mixture of 40 fl.ounces of the spirit and 20 fl.ounces of water, with gentle heat; transfer to the water-bath percolator, heat and percolate with two parts of spirit to one part of water until the drug is exhausted. Distil off the spirit, evaporate the residue to about 16 fl.ounces and filter when cold; then add the lead acetate previously dissolved in distilled water, so long as it occasions any precipitate; filter; wash the precipitate with 10 ounces of cold water, adding the washings to the filtrate; evaporate the clear liquid to eight fl.ounces, and when it has cooled, add the ammonia in slight excess, stirring thoroughly. Let stand for twelve hours, collect the precipitate on a filter, wash it once with a few ounces of cold water, dry it by gentle heat, and boil it with successive portions of

rectified spirit until the washings are no longer perceptibly bitter. Distil off most of the spirit, evaporate the residue to about $\frac{1}{2}$ ounce, and set aside to cool. Cautiously pour off the yellow mother-liquor (which contains the brucine) from the white crust of strychnine that adheres to the vessel. Wash the crust on a filter paper with a mixture of two parts of rectified spirit and one part of water until the washings cease to become red on the addition of nitric acid; finally, dissolve it by boiling with an ounce of rectified spirit and set aside to crystallize. More crystals may be obtained by evaporating the mother-liquor.

Soluble in 6400 parts of water, 110 parts of alcohol, 5500 parts of ether, 6 parts of chloroform at 25°C . (77°F .). Its bitter taste is so pronounced that 1 part in 700,000 is perceptible.

Uses. Strychnine and its salts are among the most valuable tonics known in medicine. It is given particularly in nervous exhaustion, and as a general tonic combined with other remedies.

Average dose.—0.001 Gm.=1 milligramme ($\frac{1}{64}$ grain).

Brucine. $\text{C}_{23}\text{H}_{26}\text{N}_2\text{O}_2$. This may be recovered from the yellowish mother-liquor which is poured off (see above) by concentration and crystallization.

STRYCHNINÆ HYDROCHLORIDUM. Br.

Strychnine Hydrochloride.



"The hydrochloride of an alkaloid obtained from *Nux Vomica* and from other species of *Strychnos*." <Br.

This may be prepared by dissolving the alkaloid strychnine to saturation in diluted hydrochloric acid, concentrating and crystallizing. Its uses are similar to those of strychnine but it is soluble in 35 parts of water or 60 parts of alcohol and is, therefore, much better to use in solutions. The dose is $\frac{1}{60}$ to $\frac{1}{15}$ grain.

STRYCHNINÆ NITRAS. U. S. Strychnine Nitrate.



"The nitrate [$\text{NO}_2\text{OH} \cdot \text{C}_{21}\text{H}_{22}\text{N}_2\text{O}_2$] of the alkaloid Strychnine. It should be kept in well-stoppered vials." <U. S.

This may be prepared by saturating diluted nitric acid with strychnine alkaloid, concentrating the solution by evaporation and crystallizing the nitrate of strychnine salt.

It is soluble in 42 parts of water, 120 parts of alcohol, and 60 parts of glycerin at 25°C . (77°F .); insoluble in ether.

Its uses are the same as other salts of strychnine.

Average dose.—0.001 Gm.=1 milligramme ($\frac{1}{64}$ grain).

STRYCHNINÆ SULPHAS. U. S. Strychnine Sulphate.

The sulphate $[\text{SO}_2(\text{OH})_2 \cdot (\text{C}_{21}\text{H}_{22}\text{N}_2\text{O}_2)_2 + 5\text{H}_2\text{O}]$ of the alkaloid Strychnine. It should be kept in well-stoppered vials." <U. S.

This may be prepared by dissolving strychnine in diluted sulphuric acid, concentrating the solution and crystallizing. The crystals are then drained and dried on bibulous paper. It is the most used of any of the strychnine salts because of its stability and ready solubility. It is soluble in 31 parts of water, 65 parts of alcohol at 25°C. (77°F.), insoluble in ether.

Uses. It is used in pills, mixtures, elixirs, syrups etc., alone and in combination with other medicines.

Average dose.—0.001 Gm.=1 milligramme ($\frac{1}{64}$ grain).

Other Salts of Strychnine.

Many other salts of strychnine are made by manufacturing chemists; but the foregoing are all that are official or much used. The following are listed and are occasionally used:

Strychnine Acetate. This may be prepared by neutralizing acetic acid with strychnine alkaloid, concentrating the solution and crystallizing.

Strychnine Arsenate and Arsenite. These may be prepared by combining arsenic or arsenous acids, in solution, with strychnine alkaloid.

Strychnine Cacodylate. This is prepared by neutralizing cacodylic acid with strychnine alkaloid, concentrating and evaporating.

Strychnine Glycerinophosphate. By neutralizing glycerinophosphoric acid with strychnine alkaloid, concentrating and crystallizing.

Other combinations of strychnine with various acids are produced in a similar manner as the official salts. The hypophosphite, iodide, phosphate, salicylate and valerate are used in elixirs, syrups etc.

STYRAX. U. S. Storax.**Styrax Præparatus. Br. Prepared Storax.**

"A balsam obtained from the inner bark of *Liquidambar orientalis*, Miller (Fam. Hamameliaceæ)." <U. S.

"A balsam obtained from the trunk of *Liquidambar orientalis*, Miller; and purified by solution in ethylic alcohol, filtration and evaporation of the solvent." <Br.

This balsam is used in making tincture benzoin compound and other liquid balsamic preparations, and is frequently an ingredient in ointments, plasters, cerates etc. It may also be used to advantage in some cough preparations.

Average dose.—1 Gm. (15 grains).

SUCCI — JUICES.

The name juice is applied in pharmacy to a variety of very different preparations. No juices, as such, are now official in the U. S. P., but the Br., French and German pharmacopœias recognize several inspissated and liquid juices. Besides the juices that are employed as medicinal agents, the juices of fruits are extensively used in making syrups for soda water and other purposes.

The following are the juices which may be classed as medicinal:

SUCCUS BELLADONNÆ. Br. Juice of Belladonna.

Bruise the fresh leaves and young branches of *Atropa Belladonna*, Linn.; press out the juice; to every 3 volumes of juice add 1 of alcohol (90%); set aside for 7 days; filter. Dose, 5 to 15 minims.

SUCCUS CONII. Br. Juice of Hemlock.

Bruise the fresh leaves and young branches of *Conium Maculatum*; press out the juice; to every 3 volumes of the juice add 1 of alcohol (90%); set aside for 7 days; filter. The dose is 1 to 2 fl.drachms.

SUCCUS HYOSCYAMI. Br. Juice of Henbane.

Bruise the fresh flowering tops and young branches of *Hyoscyamus niger*, Linn.; press out the juice; to every 3 volumes of juice add 1 of alcohol (90%); set aside for 7 days; filter. Dose, $\frac{1}{2}$ to 1 fl.drachm.

SUCCUS LIMONIS. Br. Lemon Juice.

"The freshly expressed juice of the ripe fruit of *Citrus medica*, Linn." < Br.

Lemon juice is but little used in medicine, but is much used at the soda fountain for making lemon syrup, lemon phosphate etc.

Lime Juice is prepared from limes by expressing the juice in the same manner as lemon juice.

SUCCUS SCOPARII. Br. Juice of Broom.

Bruise fresh broom tops; press out the juice; to every 3 volumes of juice add 1 of alcohol (90%); set aside for 7 days; filter. Dose, 1 to 2 fl.drachms.

SUCCUS TARAXACI Br. Juice of Taraxacum. [Dandelion].

Bruise fresh taraxacum root press out the juice; to every 3 volumes of the juice add 1 of alcohol (90%); set aside for 7 days; filter. The dose is 1 to 2 fl.drachms.

FRUIT JUICES.

Although these are not employed in medicine except for their flavoring and acid constituents, they are extensively used by druggists for making soda water syrups and aerated beverages. The general

process for preparing fruit juices will be found in the Soda Water Department.

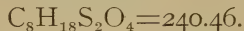
SULPHONAL. Br. Sulphonal.

"Sulphonal, or dimethyl-methane-diethylsulphone, $(\text{CH}_3)_2\text{C}(\text{SO}_2\text{C}_2\text{H}_5)_2$, is a product of the oxidation of mercaptol, $(\text{CH}_3)_2\text{C}(\text{SC}_2\text{H}_5)_2$, obtained from acetone and mercaptan." < Br.

This is official in the U. S. P. as Sulphonemethane. It belongs to the same class of compounds as trional and tetronal, and may be prepared by mixing anhydrous acetone and anhydrous mercaptan, and passing a current of dry hydrochloric acid gas through the mixture until the liquid becomes turbid and separates finally into two layers, the upper one being mercaptol (dithioethyl-dimethyl-methane), and the lower layer diluted hydrochloric acid. The mercaptol is separated, washed with water and then oxidized by heating with a solution of potassium permanganate, the liberated oxygen acting upon the mercaptol and converting it into sulphonal.

It is employed in medicine as a hypnotic, especially in delirium and alcoholism. The dose is from 10 to 30 grains for insomnia, 40 grains being administered for delirium.

SULPHONETHYLMETHANUM. U. S. Sulphonethylmethane.



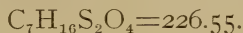
(More commonly known as Trional).

"Diethylsulphonemethylethylmethane $[\text{CH}_3(\text{C}_2\text{H}_5)\text{C}(\text{SO}_2\text{C}_2\text{H}_5)_2]$, a product of the oxidation of the mercaptol obtained by the condensation of methylethylketone with ethylmercaptan. It should be preserved in well-stoppered vials." < U. S.

Under the trade title Trional, this preparation has become popular as a sedative and hypnotic. It is soluble in 195 parts of water at 25°C . (77°F .), but is usually given in the form of pills, powders or cachets.

Average dose.—1 Gm. (15 grains).

SULPHONMETHANUM. U. S. Sulphonmethane.



(More commonly known as Sulphonal).

"Diethylsulphonedimethylmethane $[(\text{CH}_3)_2\text{C}(\text{SO}_2\text{C}_2\text{H}_5)_2]$, the product of the oxidation of the mercaptol obtained by the condensation of acetone with ethylmercaptan. It should be preserved in well-stoppered vials." < U. S.

Under the trade title Sulphonal this preparation has met with much favor as a sedative and hypnotic. It is usually given in the form of pills, powders or cachets. It is soluble in 360 parts of water at 25°C . (77°F .). Average dose.—1 Gm. (15 grains).

SULPHUR.

Symbol S; Atomic weight (O=16) 32.07; Sp. gr. of Native, 2.05.

Sulphur is an elementary substance existing in nature mostly in combination with other substances in the form of ores, but sometimes found in a free state as a result of volcanic action. It is classed chemically with selenium and tellurium and is closely allied in its analogies and characteristics to phosphorus. Its salts, the sulphides and sulphates, are very abundant in all parts of the world, and form an important part of the mineral constituents of the earth.

Sulphur is found in three different forms on the market: Sublimed sulphur, roll sulphur and precipitated sulphur, all of them having their uses in the arts and pharmacy. It combines directly with several of the elements, forming sulphides or sulphurets, which vary in their union with other bodies, some of them acting as bases and some as acids.

Sulphur and its compounds are more fully described in the Chemical Section, Part I., also under Acids, Part II.

Sulphur is employed as a disinfectant by burning, and is extensively used in the manufacture of gunpowder, pyrotechnics, vulcanized rubber and other articles of great commercial importance.

The medicinal uses of sulphur are described under the following titles:

SULPHUR LOTUM. U. S. Washed Sulphur.

S=31.83.

Sublimed Sulphur,	100 Gm. or 10 ounces
Ammonia Water,	10 Cc. or 1 fl.ounce
Water, a sufficient quantity.	

The sublimed sulphur is to be passed through a No. 30 sieve and mixed thoroughly with 100 Cc. (or 10 ounces) of water to which 10 Cc. (or 1 ounce) of ammonia water has been added. This is to be digested in a closed vessel for 3 days, with occasional agitation, then 100 Cc. (or 10 ounces) of water is to be added, and the mixture transferred to a muslin strainer and the sulphur washed with water until the washings cease to impart a blue color to red litmus paper. It is then to be drained, pressed and dried, and passed through a No. 30 sieve. <U. S.

Uses. This is intended to be used for internal administration, and is frequently mixed with cream of tartar and taken as a laxative and blood cleanser.

Average dose.—4 Gm. (60 grains).

SULPHUR PRÆCIPITATUM. U. S., Br. Lac Sulphur.**Precipitated Sulphur. Milk of Sulphur.**

S=31.83.

Sublimed Sulphur,	100 Gm. or 10 ounces
Lime,	50 Gm. or 5 ounces
Hydrochloric Acid,	
Water, of each, a sufficient quantity.	

The lime is to be slaked and mixed uniformly with 500 Cc. (or 50 ounces) of water. To this the sublimed sulphur, previously well-dried and sifted, is to be added and well mixed. Then 1000 Cc. (or 100 ounces) of water is to be added and the mixture boiled in a porcelain or glass vessel during 1 hour, stirring constantly, and replacing occasionally the water lost during evaporation. The vessel is then to be covered and the contents allowed to cool and become clear by the subsidence of the precipitate, then the clear solution is to be drawn off and the remainder filtered, and the filtered solution mixed with the portion drawn off. To this liquid hydrochloric acid previously diluted with an equal volume of water is to be gradually added with constant stirring until the liquid is nearly neutralized, but still retains an alkaline reaction and a yellow color. The precipitate which forms is to be collected on a strainer and washed until the washings are tasteless and cease to show an acid reaction with litmus paper. It is then to be rapidly dried at a moderate heat and kept in well-stoppered bottles.

Heated to 115°C. (239°F.), this melts and at a higher temperature is volatilized. It is insoluble in water and only slightly soluble in other common media. It is readily soluble in carbon disulphide, also in benzol, benzin, oil of turpentine and many other oils, and in ether, chloroform and boiling aqueous solutions of alkaline hydrates.

Uses. Precipitated sulphur is much used for making hair restoratives and generally in liquid preparations, when sulphur is required to be suspended, as it is much finer and softer than other forms of sulphur. It is also used in making ointments, cerates etc. The dose is from 30 grains to 3 drachms.

Average dose.—4 Gm. (60 grains).

SULPHUR SUBLIMATUM. U. S., Br.**Sublimed Sulphur. Flowers of Sulphur.**

S=31.83.<U. S. (H=1).

“It should contain not less than 99.5 percent. of pure Sulphur.”
<U. S.

Sublimed sulphur, or flowers of sulphur, is made by heating sulphur and conducting the vapor into properly constructed cooled chambers, where the sulphur collects on the sides and bottom in the form of a light powder, which is known in commerce as “Sulphur.” It is a

light-yellow powder, insoluble in water or alcohol, and when ignited burning with a blue flame with production of sulphurous acid gas. Brimstone, or roll sulphur, is the same chemically, but is native sulphur, melted and run into rolls or sticks, and usually contains some impurities.

It is insoluble in water and but slightly soluble in common media. It melts at 115°C . (239°F .), and is volatilized at a higher temperature.

Uses. Sublimed sulphur is used in the arts for various purposes, and given in medicine as a laxative and diaphoretic in doses of 20 to 120 grains or more. It is used externally in the form of an ointment as an application for parasitic diseases etc.

Average dose.—4 Gm. (60 grains).

SULPHURIS IODIDUM. U. S., Br. Sulphur Iodide.

The U. S. P. formula is:

Washed Sulphur,	20 Gm. or 1 ounce
Iodine,	80 Gm. or 4 ounces

Rub them together by trituration until they are thoroughly mixed, then introduce the mixture into a flask, close the orifice loosely and apply a gentle heat by water-bath so as to darken the mass without melting it. When the color has become uniformly dark throughout, increase the heat so as to liquify the mass, and incline the flask in different directions in order to return into the liquid any portion of the iodine which may have condensed on the inner surface of the flask; then pour the liquified mass upon a porcelain plate or other suitable cold surface. When it is cold break the product into pieces of suitable size, and keep them in glass-stoppered bottles in a cool place.

Nearly insoluble in water, soluble in about 60 parts of glycerin, very soluble in carbon disulphide. Alcohol and ether dissolve out the iodine, leaving the sulphur.

Uses. This compound is chiefly used for making ointment for skin diseases.

Other Forms of Sulphur.

Amorphous Sulphur. Sulphur Fuscum. Brown Sulphur. Red Sulphur. This is prepared from sublimed sulphur by melting it, increasing the heat to from 320° to 350°F ., and continuing at that temperature for about half an hour, or until it becomes brown and viscid, then pouring into water. In this state it is ductile and easily moulded like wax, but does not become fluid until heated to over 600°F .

Roll Sulphur or Brimstone. This is crude sulphur purified by melting, skimming and pouring it into moulds. It is used extensively for bleaching, (burning more readily than sublimed sulphur), and as a cement for setting stone and for many other purposes. It is seldom employed in medicine because of its impurities.

Sulphur Vivum. Black Sulphur. Crude Sulphur. Horse Brimstone. This is crude native sulphur, a gray or mouse-colored powder. It is seldom found in the market,—the residuum of the subliming pots being substituted for it. It contains quite a large percentage of arsenic, and is therefore not used except for horses and stock.

Salts of Sulphur.

Sulphur iodide is the only official salt in which sulphur acts as the basic substance. It forms compounds, however, with the other halogen elements, bromine—Bromide of Sulphur, S_2Br_2 ; and with chlorine—Chloride of Sulphur, S_2Cl_2 ; but they are seldom used.

With most of the positive elements sulphur combines, forming sulphides or sulphurets, which are noticed under the basic elements with which the combination is made. The name **hepar** was given by the old chemists to the liver-colored combinations formed by the union of sulphur with antimony, potassa, soda, calcium etc. It is still retained in homœopathic pharmacy, *hepar sulphuris* or *hepar sulphur* (*calx sulphurata*), *hepar sulphuris kalinum* (sulphuretted potash), being the official titles in their pharmacopœia.

Acids of Sulphur.

Sulphur forms acid combinations with hydrogen and oxygen that are extensively used industrially and in chemistry and medicine. These acids are fully described in the Chemical Section of this work, Part I., and among the Acids, Part II.

SUPPOSITORIA — SUPPOSITORIES.

Suppositories are bodies, usually of conical or oblong conical shape, made of some substance readily melted or soluble at the temperature of the internal body cavities. They are prepared with medicinal substances mixed with the mass so that their effect will be obtained as the suppository melts.

Moulds of suitable size may be obtained for making suppositories, the ones most usually employed being oblong or conical shaped for making rectal suppositories.

Many substances have been employed as a base for suppositories, but none has been found so suitable for this purpose as oil of theobroma ("butter of cacao").

It melts readily at the temperature of the body, yet has consistence enough to retain its form at ordinary temperatures. It is mild, bland and non-irritant. Many attempts have been made to introduce suppositories in which gelatin is used as a base; but without much success, for the reason that it cannot be made soluble at the normal temperature of the body, and is therefore worthless for this purpose. Glycerin suppositories have, however, been successfully made and have become standard among galenicals.

The following is in substance the general formula for suppositories given in the U. S. Pharmacopœia:

General Formula for Suppositories.

For suppositories made with Oil of Theobroma.

Take of the Medicinal Ingredient, the prescribed quantity.

Oil of Theobroma, a sufficient quantity.

Having weighed out the medicinal ingredients or ingredient, and the quantity of oil of theobroma required according to the kind of suppository to be prepared, (see below), mix the medicinal portion (previously brought to the proper consistence if necessary), with a small quantity of oil of theobroma by rubbing them together, and add the mixture to the remainder of the oil of theobroma, previously melted and cooled to the temperature of 38°C . (100.4°F .). Then mix thoroughly without applying more heat, and immediately pour the mixture into suitable moulds. The moulds must be kept cold by being placed on ice or by immersion in ice-water before the melted mass is poured in, and kept at a freezing temperature until the suppositories have hardened and are ready to be removed. In the absence of suitable moulds, suppositories may be formed by allowing the mixture, prepared as above, to cool, care being taken to keep the ingredients well mixed, dividing the mass into parts of a definite weight, and moulding by hand to the proper shape.

Suppository Machines or Presses, either horizontal or vertical, may now be bought at a reasonable price, by which suppositories are pressed cold into a form of the required shape; the medicinal ingredients being first incorporated with the cacao butter to form a mass or powder. With a press of this kind the making of suppositories is greatly facilitated.

For suppositories containing chloral, phenol, their derivatives, or substances which soften the vehicle, raise the melting point of the oil of theobroma by the addition of from 1 to 15 percent. of spermaceti, but the melting point must not be raised above 37°C . (98.6°F .).

Rectal Suppositories should be cone-shaped or spindle-shaped, and when made from the oil of theobroma should weigh about 2 grammes (30 grains).

Urethral Suppositories (Bougies) should be pencil-shaped, pointed at one extremity and either seven centimeters in length, weighing about 2 grammes, or fourteen centimeters in length, weighing about 4 grammes, when made with glycerin or gelatin. If prepared with oil of theobroma they should weigh about one-half of the above quantities.

Vaginal Suppositories should be globular or oviform in shape and weigh about 10 grammes if made with glycerinated gelatin, and about 4 grammes if made with oil of theobroma.

For suppositories made with Glycerinated Gelatin the following process may be used:

Take of the Medicinal Substance, the prescribed quantity.

Glycerinated Gelatin,

Glycerin,

Water, each a sufficient quantity.

"Mix the medicinal substance, if solid and soluble in water or glycerin, or if a miscible liquid, with a little water and add sufficient glycerin to make the weight of the mixture one-half that of the finished mass. Then thoroughly incorporate it with an equal weight of melted glycerinated gelatine, and pour it at once into suitable moulds which have been greased with a small quantity of petrolatum. Cool the moulds thoroughly before removing the suppositories.

"Moulds for urethral suppositories should be warmed sufficiently before pouring the mass to facilitate the proper filling of the mould. Suppositories having a firmer consistence may be prepared by substituting mucilage of gum of acacia for a portion of the water or glycerin."

"If the medicinal substance be insoluble in water or glycerin, thoroughly levigate it in a warm mortar with a sufficient quantity of glycerin to make the weight of the mixture one-half that of the finished mass. Then thoroughly incorporate it with an equal weight of melted glycerinated gelatin, and pour it into suitable moulds as above directed."

"With bulky powders about one-half of the glycerin may be replaced with water before levigation. Glycerinated Gelatine Suppositories should be protected against the effects of heat and moisture and dry air by keeping them in tightly closed containers in a cool place." <U. S.

SUPPOSITORIA ACIDI CARBOLICI. Br. Phenol Suppositories.

Phenol, 12 grains or 0.8 Gm.

White Beeswax, 24 grains or 1.6 Gm.

Oil of Theobroma, melted, a quantity sufficient to form with the phenol and beeswax a mixture which will fill 12 suitable moulds, each capable of holding 15 to 16 grains (or about 1 Gm.) of the oil of theobroma.

"Dissolve the phenol in the oil of theobroma and beeswax, previously melted together at a low temperature, and pour the mixture into the moulds; or let the mixture cool and then divide it into 12 equal parts of a conical or other convenient form for a suppository."
<Br.

Each suppository contains 1 grain (or 0.067 Gm.) of phenol.

SUPPOSITORIA ACIDI TANNICI. Br.**Tannic Acid Suppositories.**

Tannic Acid, 36 grains or 2.4 Gm.

Oil of Theobroma, a sufficient quantity

to form with the tannic acid a mixture which will fill 12 suitable moulds, each capable of holding 15 to 16 grains (or about 1 Gm.) of oil of theobroma.

"Melt the oil of theobroma; triturate the tannic acid intimately with a little of the oil and add to the remainder; stir well, or let the mixture cool and then divide it into 12 equal parts of a conical or other convenient form for a suppository." < Br.

Each suppository contains 3 grains (or 0.2 Gm.) of tannic acid.

SUPPOSITORY ALOES.

Aloes, in very fine powder, 0.50 Gm.

Butter of Cacao, 3.50 Gm.

Melt the cacao butter by gentle heat and at the moment of cooling add the powdered aloes, incorporate thoroughly and run into a mould.

The formula is for one suppository, which is 4 Gm., the official size for adults.

SUPPOSITORIA BELLADONNÆ. Br. Belladonna Suppositories.

Alcoholic Extract of Belladonna, 18 grains or 1.2 Gm.

Oil of Theobroma, a sufficient quantity for 12 suppositories.

"Proceed as directed for tannic acid suppositories." < Br.

Each suppository contains approximately $\frac{1}{60}$ grain (0.001 Gm.) of the alkaloids of belladonna root.

SUPPOSITORIA CACAO.

Simple suppositories of cacao butter, 15, 20, 30, or larger may be made as directed in the general formula.

Butter of Cacao, 4 Gm.

Melt by gentle heat and when cool so that it will just flow readily, pour into a mould of the capacity of 4 Gm.

Any medicament may be incorporated with the cacao butter by reducing it to proper condition and adding it at the moment of cooling, but while the liquified fat is still fluid enough to run into the moulds.

SUPPOSITORIA GLYCERINI. U. S., Br.**Suppositories of Glycerin. Glycerin Suppositories.**

The U. S. formula is:

Glycerin, 30 Gm. or 1 oz. av. + 25 grains

Monohydrated Sodium Carbonate,

0.5 Gm. or 8 grains

Stearic Acid, 2 Gm. or 31 grains

Water, 5 Cc. or 81 minims

To make 10 rectal suppositories.

"Dissolve the monohydrated sodium carbonate in the water and add it to the glycerin contained in a dish on a water-bath; add the stearic acid, and heat the mixture carefully until carbon dioxide ceases to be evolved, and the liquid is clear. Then pour the melted mass into suitable moulds, remove the suppositories when they are perfectly cold and preserve them in glass vessels." <U. S.

The Br. P. formula is:

Gelatin, cut small,	½ ounce or 14.2 Gm.
Glycerin, by weight,	2½ ounces or 71.0 Gm.
Distilled Water, a sufficient quantity.	

Place the gelatin in a weighed evaporating dish with sufficient distilled water to cover it; let it stand for 2 minutes; pour off the excess of distilled water; set aside until the gelatin is quite soft; add the glycerin; dissolve on a water-bath; evaporate until the mixture weighs 1563 grains (or 102 Gm.). Pour the product into suppository moulds having capacities equal to 30, 60, or 120 grains (or 2, 4, or 8 Gm.) of the suppository, or of such other capacities as may be required." <Br.

SUPPOSITORIA IODOFORMI. Br. Iodoform Suppositories.

Iodoform, 36 grains or 2.4 Gm.

Oil of Theobroma, a sufficient quantity for 12 suppositories.

"Proceed as directed for tannic acid suppositories." <Br.

Each suppository contains 3 grains (or 0.2 Gm.) of iodoform.

SUPPOSITORIA MORPHINÆ. Br. Morphine Suppositories.

Morphine Hydrochloride, 3 grains or 0.2 Gm.

Oil of Theobroma, a sufficient quantity for 12 suppositories.

"Proceed as directed for tannic acid suppositories." <Br.

Each suppository contains ¼ grain (or 0.017 Gm.) of morphine hydrochloride.

SUPPOSITORIA PLUMBI COMPOSITA. Br.

Compound Lead Suppositories.

Lead Acetate, in powder, 36 grains or 2.4 Gm.

Opium, in powder, 12 grains or 0.8 Gm.

Oil of Theobroma, a sufficient quantity for 12 suppositories.

Each suppository contains 3 grains (or 0.2 Gm.) of lead acetate and 1 grain (or 0.067 Gm.) of opium.

SUPPOSITORY RHATANIA.

Extract of Rhatany, dried and powdered, 1 Gm.

Butter of Cacao, 3 Gm.

Make a suppository in the same manner as is directed for aloes suppositories.

Suppositories may be prepared from other extracts in the same way.

A great number and variety of suppositories are listed by manufacturers and may be made by druggists in the same general manner as the foregoing.

SYRUPI — SYRUPS.

Syrups, as understood in pharmacy, are concentrated solutions of sugar in water or other aqueous liquids, containing usually some flavoring or medicinal ingredients. They are prepared by dissolving the sugar in the flavored or medicinal solution either by the aid of heat or agitation, or by stirring cold, the latter method being now generally employed as the flavor of the preparation is better retained by the cold process.

The simple flavored syrups are usually prepared by adding the flavoring essence or extract to simple syrup, and shaking them well together.

The best process for making most syrups is by water-bath percolation, as by this method the making of the syrup is facilitated by the heat without exposure, and the flavor and strength of the preparation is unimpaired.

Only the best quality of granulated sugar should be used in making syrups, and the water should, if not distilled, be free from all impurities. Rain water, or water from melted ice, boiled and filtered, is sufficiently pure for most purposes.

Many of the syrups do not keep well during the summer. Such syrups should only be made in small quantities and if admissible should be rubbed in a mortar with a few drops of oil of cloves, which prevents them from spoiling for a long time. Syrups should be made slightly heavier of sugar for summer use than when designed to be used in the winter.

The addition of Solution of Saccharin, 1 fl.drachm to each pint of syrup (1 fl.ounce to a gallon) insures its keeping and makes it sweeter. It is perfectly harmless.

A great number of syrups are employed in pharmacy, but only a comparatively small number are official. Those official in the leading pharmacopœias will first be considered, and then the more important unofficial syrups.

SYRUPUS. U. S., Br. Syrup. Simple Syrup.

In the drug business this is commonly known as simple syrup, and is prescribed by most physicians, abbreviated "Syr. Simp." (syrupus simplex, or, in the genitive *syrupi simplicis*). It is probably the most used of any official preparation. The present U. S. P. formula is:

Sugar, in coarse powder,	850 Gm. or 30 ounces av.
Distilled Water, to make	1000 Cc. or 34 fl.ounces

The sugar is to be dissolved with the aid of heat in 450 Cc. (or 16 fl.ounces) of distilled water, the temperature is then to be raised to the boiling point, and the syrup is to be strained and enough distilled water passed through the strainer to make the product, when cold, measure 1000 Cc. (or 34 fl.ounces). <U. S.

A cold process for preparing syrup is also given as follows:

"Press down into the neck of a percolator of suitable size, a pledget of purified cotton, not too tightly, and in such a manner that the cotton shall nearly fill the neck of the percolator, and moisten it with a few drops of distilled water. Place the sugar into the percolator, make its surface level without shaking or jarring, then carefully pour upon it 450 Cc. (or 16 fl.ounces) of distilled water, and regulate the flow of the liquid if necessary, so that it will pass out in rapid drops. Return the first portions of the percolate, until it runs through clear, and, when all the liquid has passed, follow it by distilled water added in portions, so that all the sugar may be dissolved and the product measure 1000 Cc. (or 34 fl.ounces). Mix thoroughly." <U. S.

The sp. gr. of the present official syrup is 1.314 at 25°C. (77°F.). It may be stated that most druggists do not make syrup fully up to the official standard, as it is liable to crystallize; 7 pounds av. of granulated sugar with enough distilled water to make 1 gallon, makes a good syrup for ordinary dispensing and use; a little less quantity of sugar is required in winter than in summer.

Made by Water-Bath Percolation.

Sugar, granulated,	7 pounds
Solution of Saccharin,	1 ounce
Distilled, or Pure Water, enough to make a gallon.	

Having covered the perforated diaphragm of the water-bath percolator with a piece of muslin or cotton flannel, put the sugar upon it in the percolator, and add to it 3 pints of boiling water, heat the water surrounding the percolator to boiling, stirring the contents of the percolator occasionally, then draw off by the stop-cock and add enough distilled water through the percolator to make a gallon.

It will be readily seen that this is the most convenient and practical way to make simple syrup. It is not only made, but strained or filtered at the same operation, and produces a clear, bright syrup.

If it is desirable to make the syrup (or any syrup) without heat, it may be made in the same manner, simply omitting the heat.

For other purposes syrup is variously made, as flavored syrup for making elegant preparations, soda water syrup for making soda water etc.

The Br. P. formula is:

Refined Sugar,	5 pounds or 1000 Gm.
Distilled Water, (boiling), a sufficient quantity.	

Add the refined sugar to 2 pints (Imperial measure) (or 500 Cc.) of the boiling distilled water; heat until dissolved; make the weight of the product $7\frac{1}{2}$ pounds (or 1500 Gm.), by the addition of boiling distilled water. Sp. gr. 1.330.

It will be observed that the Br. syrup is slightly heavier than the U. S., but not enough heavier to make any difference in most preparations.

SYRUPUS ACACIÆ. U. S. Syrup of Acacia.

Acacia, in selected pieces,	100 Gm. or $3\frac{1}{2}$ ounces av.
Sugar,	800 Gm. or $28\frac{1}{4}$ ounces av.
Distilled Water,	430 Cc. or $14\frac{1}{2}$ fl.ounces
To make	1000 Cc. or 34 fl.ounces

"Introduce the acacia into an enamelled or porcelain dish, add the distilled water, and stir occasionally until the acacia is dissolved; then, having added the sugar, place the dish on a water-bath and apply heat, gradually increasing the temperature, and stirring from time to time until the sugar is dissolved. Strain the syrup, if necessary, and add sufficient distilled water to make the product measure 1000 Cc. (or 34 fl.ounces)." < U. S.

This may be prepared by water-bath percolation if preferred, or it may be preserved by the addition of $\frac{1}{4}$ ounce solution of saccharin to the above quantity.

SYRUPUS ACIDI CITRICI. U. S. Syrup of Citric Acid.

As syrup of lemon is omitted in the present revision of the U. S. P., this is intended to take its place, and whenever syrup of lemon is prescribed it may be used.

Citric Acid,	10 Gm. or 60 grains
Distilled Water,	10 Cc. or 1 fl.drachm
Tincture of Fresh Lemon Peel,	10 Cc. or 1 fl.drachm
Syrup, sufficient to make	1000 Cc. or $12\frac{1}{2}$ fl.ounces

The citric acid is to be dissolved in the distilled water and the solution mixed with 500 Cc. (or 6 ounces) of syrup. The tincture of lemon peel is then to be added, and lastly enough syrup to make the product 1000 Cc. (or $12\frac{1}{2}$ fl.ounces), and the whole thoroughly mixed.

SYRUPUS ACIDI HYDRIODICI. U. S. Syrup of Hydriodic Acid.

"A syrupy liquid containing about 1 percent., by weight, of absolute hydriodic acid (HI), or about 1.19 Gm. in 100 Cc." < U. S.

Diluted Hydriodic Acid,	100 Gm. or 1 ounce av.
Water,	300 Gm. or 3 ounces av.
Syrup,	600 Gm. or 6 ounces av.

Mix them. Sp. gr. about 1.190 at 25°C . (77°F).>

Average dose.—4 Cc. (1 fl.drachm).

SYRUPUS AMYGDALÆ. U. S. Syrup of Almond.

Spirit of Bitter Almond,	10 Cc. or 46 minims
Orange Flower Water,	100 Cc. or 1 fl.ounce
Syrup, a sufficient quantity to make	1000 Cc. or 10 fl.ounces

Mix them.

Average dose.—4 Cc. (1 fl.drachm).

SYRUPUS AROMATICUS. Br. Aromatic Syrup.

Tincture of Orange, (Br.),	250 Cc. or 5 fl.ounces
Cinnamon Water,	250 Cc. or 5 fl.ounces
Syrup,	500 Cc. or 10 fl.ounces

Mix the tincture of orange and cinnamon water; shake the mixture with a little powdered talc; filter; add the syrup. <Br.

Dose, $\frac{1}{2}$ to 1 fl.drachm.

SYRUPUS AURANTII. U. S., Br. Syrup of Orange.

The U. S. P. formula is:

Tincture of Sweet Orange Peel,	50 Cc. or 1 fl.ounce
Citric Acid,	5 Gm. or 45 grains
Magnesium Carbonate,	10 Gm. or 90 grains
Sugar,	820 Gm. or 16 $\frac{3}{8}$ ounces av.
Water, sufficient to make	1000 Cc. or 20 fl.ounces

"Triturate the magnesium carbonate in a mortar with the tincture, add gradually 400 Cc. (or 8 fl.ounces) of water, filter, and add sufficient water through the filter to obtain 450 Cc. (or 10 fl.ounces) of filtrate; in this dissolve the citric acid and sugar by agitation without heat, and add sufficient water to make the product measure 1000 Cc. (or 20 fl.ounces). Mix thoroughly." <U. S.

The Br. P. formula is:

Tincture of Orange,	1 fl.ounce or 30 Cc.
Syrup,	7 fl.ounces or 210 Cc.

Mix. Dose, $\frac{1}{2}$ to 1 fl.drachm.

As syrup of orange is used only for its agreeable flavor, and has no medicinal value, it seems unnecessary to go to so much trouble to make it when a simpler method will answer the purpose as well. The following formula is therefore given, which will make a fine preparation, provided only a good quality of orange oil is used:

Oil of Orange,	40 minims
Alcohol,	2 fl.drachms
Magnesium Carbonate,	80 grains
Sugar, granulated,	28 ounces av.
Water, sufficient to make	32 fl.ounces

Dissolve the oil of orange in the alcohol and rub with the magnesium carbonate in a mortar, gradually adding 12 fl.ounces of water; heat to about 75°C. (167°F.) in a pint bottle on a water-bath for one hour,

then filter and add enough water through the filter to make 14 fl.ounces; dissolve the sugar in the filtrate by agitation or percolation and add enough water, if necessary, to make 32 fl.ounces of the syrup.

SYRUPUS AURANTII FLORUM. U. S.**Syrup of Orange Flowers.**

Sugar,	850 Gm. or 17½ ounces av.
Orange Flower Water,	
sufficient to make,	1000 Cc. or 20 fl.ounces

The sugar is to be dissolved in 450 Cc. (or 9 fl.ounces) of orange flower water, by agitation, without the aid of heat, and enough orange flower water then added to make the product measure 1000 Cc. (or 20 fl.ounces). This syrup may also be made by percolating the sugar with orange flower water until it is dissolved and 1000 Cc. (or 20 fl.ounces) are obtained. <U. S.

Syrupus Aurantii Floris. Br. Syrup of Orange Flowers. "Orange flower water of commerce, undiluted, 8 fl.ounces (or 100 Cc.); refined sugar 3 pounds (or 600 Gm.); distilled water, boiling, a sufficient quantity. Add the refined sugar to 16 fl.ounces (or 200 Cc.) of the boiling water; heat until dissolved; add the undiluted orange flower water; make the weight of the product 4½ pounds (or 900 Gm.), by the addition of recently boiled distilled water." <Br. Dose, ½ to 1 fl.drachm.

SYRUPUS CALCIS. U. S. Syrup of Lime.**Syrup of Calcium Hydroxide.**

Lime,	65 Gm. or 1 ounce
Sugar,	400 Gm. or 6 ounces
Water, sufficient to make	1000 Cc. or 15 fl.ounces

Slake the lime by the addition of 35 Cc. (or 2 ounces) of water, with the aid of heat, then mix it and the sugar thoroughly in a mortar, so as to form a homogeneous powder; add the mixture to 500 Cc. (or 7½ ounces) of boiling water, contained in a bright copper or tinned-iron vessel, and boil for five minutes, constantly stirring. Dilute the liquid with sufficient water to make it measure 950 Cc. (or 14 fl.ounces) and filter through white paper, closely covering the funnel during filtration. Then add through the filter enough water to make the product measure 1000 Cc. (or 15 fl.ounces) and mix thoroughly. Keep the syrup in well-stoppered bottles." <U. S.

Sp. gr. about 1.145 at 25°C. (77°F.).

Average dose.—2 Cc. (30 minims).

SYRUPUS CALCII LACTOPHOSPHATIS. U. S., Br.**Syrup of Calcium Lactophosphate.**

Precip. Calcium Carbonate,	25 Gm. or 228 grains
Lactic Acid,	60 Cc. or 1.2 fl.ounces

Phosphoric Acid,	36 Cc.	or	6 fl.drachms
Orange Flower Water,	50 Cc.	or	8 fl.drachms
Sugar,	725 Gm.	or	15 ounces av.
Water, to make	1000 Cc.	or	20 fl.ounces

The lactic acid is to be mixed with 100 Cc. (or 2 fl.ounces) of water contained in a capacious mortar, and the calcium carbonate is to be added, gradually, in portions, until it is dissolved. The phosphoric acid is then to be added and triturated until the precipitate at first formed is dissolved. Then 150 Cc. (or 3 fl.ounces) of water is to be added and the solution filtered, rinsing the mortar with 75 Cc. (or 1¼ fl.ounces) of water and passing the washings through the filter. The orange flower water is then to be added to the mixed filtrates and the sugar dissolved in the liquid by agitation, without heat. The syrup is then to be strained and enough water passed through the strainer to make 1000 Cc. (or 20 fl.ounces) of the syrup. <U. S.

The Br. formula is almost identical with the U. S. when the difference in strength of the phosphoric acid is taken into account.

This is essentially the same as was first published in Fenner's Formulary. The addition of a fl.drachm of hydrochloric acid to the finished syrup tends to prevent the precipitation which is so common in this preparation. In fact, as the syrup is prepared by many manufacturers, it contains hardly any lactic acid, its place being supplied by hydrochloric acid, which is cheaper and makes a more stable preparation. This syrup is given as a nutritive tonic in doses of a teaspoonful or more.

SYRUPUS CASCARÆ AROMATICUS. Br.

Aromatic Syrup of Cascara.

Liquid Extract of Cascara,	8 fl.ounces	or	400 Cc.
Tincture of Orange,	2 fl.ounces	or	100 Cc.
Alcohol, (90%),	1 fl.ounce	or	50 Cc.
Cinnamon Water,	3 fl.ounces	or	150 Cc.
Syrup,	6 fl.ounces	or	300 Cc.

Mix. Dose, ½ to 2 fl.drachms.

SYRUPUS CHLORAL. Br. Syrup of Chloral.

Chloral Hydrate,	91.43 Gm.	or	1600 grains
Distilled Water,	93.75 Gm.	or	30 fl.drachms
Syrup,	a sufficient quantity.		

Dissolve the chloral in the distilled water and add enough syrup to make the measure 20 fl.ounces (or 500 Cc.).

This syrup contains 10 grains of chloral in a fl.drachm and is used as a hypnotic and anodyne. It should be freshly made when wanted. A teaspoonful contains 10 grains of the salt. The dose is ½ to 2 fl.drachms.

SYRUPUS CODEINÆ. Br. Syrup of Codeine.

Codeine Phosphate,	4.57 Gm. or 40 grains
Distilled Water,	12.5 Cc. or $\frac{1}{4}$ fl.ounce
Syrup,	987.5 Cc. or 19 $\frac{3}{4}$ fl.ounces

Dissolve the codeine phosphate in the distilled water; add the syrup; mix. <Br.

A fl.drachm of this syrup contains $\frac{1}{4}$ grain of codeine phosphate.

Dose, $\frac{1}{2}$ to 1 fl.drachm.

SYRUPUS FERRI IODIDI. U. S., Br.**Syrup of Ferrous Iodide.**

"A syrupy liquid containing about 5 percent., by weight, of ferrous iodide, (FeI₂), or about 6.74 Gm. in 100 Cc." <U. S.

Iron, in the form of fine, bright wire,
and cut into small pieces,

	12.5 Gm. or 193 grains
Iodine,	41.5 Gm. or 640 grains
Diluted Hypophosphoric Acid,	20 Cc. or 325 minims
Sugar,	600 Gm. or 21 oz. av.+72 gr.
Distilled Water, a sufficient quantity	

To make 1000 Gm. or 35 $\frac{1}{4}$ ounces av.

The iron wire is to be introduced into a thin glass flask having a capacity of about 500 Cc. (or 1 pint), and distilled water 150 Cc. (or 5 fl.ounces) added, and afterwards the iodine. The mixture is to be shaken occasionally, checking the reaction if necessary by pouring cold water over the flask, and when the solution has become of a greenish color and no longer has the odor of iodine it is to be heated to boiling and sugar 50 Cc. (or 1 $\frac{3}{4}$ ounces av.) added; when dissolved the solution is to be filtered into the remainder of the sugar contained in a porcelain dish. The flask containing the residue of the iron wire is to be rinsed with 125 Cc. (or 4 $\frac{1}{4}$ fl.ounces) of distilled water and the washing passed through the filter into the sugar. The mixture is then to be stirred with a porcelain or wooden spatula, and heated upon a water-bath until the sugar is completely dissolved. The syrup is then to be strained through a clean muslin strainer into a tared bottle, the hypophosphoric acid added, and enough distilled water to make the product weigh 1000 Gm. (or 35 $\frac{1}{4}$ ounces av.). <U. S.

The sp. gr. of this syrup is about 1.349 at 25°C. (77°F.). If put up in small bottles and wrapped in dark paper it will keep unchanged for a long time. Average dose, 1 Cc. (15 minims).

SYRUPUS FERRI OXYDATI. P. G. Syrup of Iron Oxide.**Eisenzuckersirup.**

Saccharated Iron Oxide,

Syrup,

Water, of each equal parts by weight.

Mix them and dissolve. It contains 1 percent. of iron and is given as a mild ferruginous tonic. The dose is a teaspoonful or more.

SYRUPUS FERRI PHOSPHATIS. Br.**Syrup of Ferrous Phosphate.**

Iron, in wire, 8.6 Gm. or 75 grains

Conc. Phosphoric Acid (66.3%), 62.5 Cc. or 1¼ fl.ounces

Syrup, 700 Cc. or 14 fl.ounces

Distilled Water, a sufficient quantity.

“Place the iron wire and the concentrated phosphoric acid, previously diluted with an equal volume of distilled water, in a small flask; plug the neck with cotton wool, and heat gently until the iron is dissolved. When cold, filter into the syrup, and pass a sufficient quantity of distilled water through the filter to make the product measure 20 fl.ounces (or 1000 Cc.). Dose, ½ to 1 fl.drachm. < Br.

1 fl.drachm of this syrup represents 1 gram of anhydrous ferrous phosphate.

This syrup is much more readily prepared by mixing

Solution Iron Phosphate, 2 fl.drachms

Syrup, 15 fl.ounces

Or, by dissolving soluble iron phosphate, in scales, 128 grains in 6 fl.ounces hot water, adding 14 ounces av. of sugar, and then enough water to make a pint.

The dose is a teaspoonful or more as an iron tonic.

SYRUPUS FERRI QUININÆ ET STRYCHNINÆ PHOSPHATUM. U. S.**Syrup of the Phosphates of Iron, Quinine and Strychnine.**

The U. S. Formula is

Glycerite of the Phosphates of Iron,

Quinine and Strychnine, 250 Cc. or 4 fl.ounces

Syrup, a sufficient quantity to make 1000 Cc. or 16 fl.ounces

Mix them, strain if necessary.

Average dose, 4 Cc. (1 fl.drachm).

Syrupus Ferri Phosphatis cum Quinina et Strychnina. Br.

Iron, in wire, 75 grains (or 8.6 Gm.), concentrated phosphoric acid, (Br.), 1¼ ounce (or 62.5 Cc.), strychnine, in powder, 5 grains (or 0.57 Gm.), quinine sulphate, 130 grains (or 14.8 gm.), syrup, 14 fl.ounces (or 700 Cc.), distilled water, a sufficient quantity. Place

the iron wire and the concentrated phosphoric acid, previously diluted with an equal volume of distilled water, in a small flask; plug the neck with cotton-wool, and heat gently until the iron is dissolved; in the resulting solution dissolve the strychnine and quinine sulphate; filter into the syrup; pass sufficient distilled water through the filter to make the product measure 20 fl.ounces (or 1000 Cc.). Dose, $\frac{1}{2}$ to 1 fl.drachm. < Br.

One fl.drachm of this syrup represents 1 grain of anhydrous ferrous phosphate, $\frac{4}{5}$ grain of quinine sulphate, and $\frac{1}{32}$ grain of strychnine.

Syrup Phosphate of Iron, Quinine and Strychnine.
Easton's Syrup.

This preparation has been much used in the past, but is now superseded by the U. S. official syrup. As some druggists may still wish to prepare it, the formula is given:

Sulphate of Iron,	1 $\frac{3}{4}$ ounces av.
Sodium Phosphate,	1 $\frac{3}{4}$ ounces av.
Quinine, (alkaloid),	1 ounce av.
Strychnine, (alkaloid),	8 grains
Phosphoric Acid, (1880),	4 fl.ounces
Sugar,	4 pounds
Water, a sufficient quantity.	

Dissolve the iron sulphate and the sodium phosphate each separately in a quart of water, add the iron solution to the sodium solution, gradually and with constant stirring, and wash the precipitate until the washings are tasteless; then collect the precipitate, drain and press quickly, and dissolve in the phosphoric acid. Add sufficient water to the solution to make 36 fl.ounces, dissolve the quinine and strychnine in the solution, filter, and dissolve the sugar in the filtrate. The dose is a teaspoonful as a tonic, containing about 1 grain each iron and quinine, and $\frac{1}{64}$ grain strychnine.

SYRUPUS GLUCOSI. Br. Syrup of Glucose.

Liquid Glucose of commerce,	25 Gm. or 1 ounce
Syrup,	50 Gm. or 2 ounces
Mix, by the aid of gentle heat.	

SYRUPUS HEMIDESMI. Br.

Syrup of Hemidesmus. [Indian Sarsaparilla].

Hemidesmus Root, bruised,	100 Gm. or 4 ounces av.
Refined Sugar,	700 Gm. or 28 ounces av.
Boiling Distilled Water,	500 Cc. or 20 fl.ounces

"Infuse the hemidesmus root in distilled water in a covered vessel for 4 hours and strain. Set the infusion aside until clear; then decant

the clear liquid, add the refined sugar, and dissolve by the aid of gentle heat. The weight of the product should be 42 ounces (or 1050 Gm.). Dose, $\frac{1}{2}$ to 1 fl.drachm." < Br.

Syrup of Sarsaparilla of any other kind may be made in the same proportions and manner.

SYRUPUS HYPOPHOSPHITUM. U. S.

Syrup of Hypophosphites.

This is the old "Compound Syrup of Hypophosphites of Lime, Soda and Potassa," which was formerly much used under the quoted title, and was also known as "Churchill's Syrup of Hypophosphites Compound." At present compound syrups of hypophosphites containing quinine and strychnine are more generally used.

Calcium Hypophosphite, 45 Gm. or 1 ounce av. + 258 grains
Potassium Hypophosphite,

15 Gm. or 231 grains

Sodium Hypophosphite, 15 Gm. or 231 grains

Sugar, 650 Gm. or 23 ounces av.

Diluted Hypophosphorus Acid,

2 Gm. or 31 grains

Tincture of Fresh Lemon Peel,

5 Cc. or 82 minims

Water, a sufficient quantity to make

1000 Cc. or 33 $\frac{7}{8}$ fl.ounces

The hypophosphites are to be mixed and triturated with 450 Cc. (or 15 ounces) of water until they are dissolved, the tincture of lemon peel and the hypophosphorous acid are then to be added and the liquid filtered. The sugar is to be dissolved in the filtrate by agitation, without heat, and enough water added through the filter to make the measure 1000 Cc. (or 33 $\frac{7}{8}$ fl.ounces). This syrup may also be made by percolating the sugar with the filtered liquid, and adding enough water through the percolator to make the required measure. < U. S.
Average dose.—8 Cc. (2 fl.drachms).

SYRUPUS HYPOPHOSPHITUM COMPOSITUS. U. S.

Compound Syrup of Hypophosphites.

Calcium Hypophosphite, 35.00 Gm. or 540 grains

Potassium Hypophosphite, 17.50 Gm. or 270 grains

Sodium Hypophosphite, 17.50 Gm. or 270 grains

Ferric Hypophosphite, 2.25 Gm. or 35 grains

Manganese Hypophosphite, 2.25 Gm. or 35 grains

Quinine, 1.10 Gm. or 17 grains

Strychnine, 0.115 Gm. or 1 $\frac{3}{4}$ grains

Sodium Citrate, 3.75 Gm. or 58 grains

Diluted Hypophosphorous Acid,

15.00 Gm. or 243 minims

Sugar, 775.00 Gm. or 27 $\frac{1}{4}$ ounces av.
 Water, a sufficient quantity

To make 1000 Cc. or 33 $\frac{3}{4}$ fl.ounces

The ferric and manganese hypophosphites are to be rubbed with the sodium citrate, and 30 Cc. (or 1 fl.ounce) of water added; the mixture is to be warmed for a few moments until a clear greenish solution is obtained. The other hypophosphite salts are to be dissolved in 450 Cc. (or 8 fl.ounces) of water to which 5 Cc. (or 85 minims) of diluted hypophosphorous acid has previously been added. The quinine and strychnine are to be dissolved in 30 Cc. (or 1 fl.ounce) of water, with the aid of 10 Cc. (or 152 minims) of diluted hypophosphorous acid. The several solutions are to be mixed and the sugar dissolved in the mixture by agitation, without heat. The syrup is to be strained if necessary and enough water added to make the measure 1000 Cc. (or 33 $\frac{3}{4}$ fl.ounces) of syrup. <U. S.

Average dose.—8 Cc. (2 fl.drachms).

SYRUPUS IPECACUANHÆ. U. S. Syrup of Ipecac.

Fluidextract of Ipecac, 70 Cc. or 1 fl.ounce+80 minims
 Acetic Acid, 10 Cc. or 76 minims
 Glycerin, 100 Cc. or 1 $\frac{2}{3}$ fl.ounces
 Sugar, 700 Gm. or 12 $\frac{1}{3}$ ounces av.
 Water, a sufficient quantity

To make 1000 Cc. or 17 fl.ounces

The fluidextract of ipecac is to be diluted with 300 Cc. (or 5 fl.ounces) of water to which the acetic acid has previously been added, and well mixed by shaking. The mixture is then to be filtered and enough water poured through the filter to make the measure 500 Cc (or 8 $\frac{1}{2}$ fl.ounces). To this the glycerin is to be added and the sugar dissolved in the mixture; finally adding enough water to make the product measure 1000 Cc. (or 17 fl.ounces). <U. S.

The druggist may readily ascertain if his fluidextract contains resin by adding a few drops of it to water. If it contains resin it will have a muddy or cloudy appearance; if free from it the result will be a clear solution. If it contains resin the syrup should be made as follows:

Fluidextract of Ipecac, 2 fl.ounces
 Water, 13 fl.ounces
 Sugar, 28 ounces av.

Mix the extract with the water and half the sugar, and allow to stand until the sugar is dissolved, then filter, add the remainder of the sugar and dissolve by percolation or gentle heat, adding water, if necessary, to make two pints.

If it is desired to make the syrup of ipecac from the root instead of the fluidextract, it may be made by the following formula:

Ipecac, in moderately fine powder,	8 ounces av.
Alcohol,	4 fl.ounces
Sugar, in coarse powder,	7 pounds
Water, a sufficient quantity.	

Moisten the ipecac with the alcohol and pack moderately in a water-bath percolator; pour upon it 4 ounces of water and set in a warm place for 24 hours; then heat very moderately and after 1 hour begin to percolate, adding water to the drug and continuing the heat and percolation until 2 pints have passed. Evaporate this by means of a water-bath—boiling it for a few minutes—to a pint, and when cool, filter; add to the filtrate enough water to make 60 fl.ounces and dissolve the sugar in the liquid by gentle heat, or water-bath percolation. The product should be one gallon of syrup. Lastly, while still warm, put it in half-pint, well-stopped bottles, and set away in a cool place.

Syrup of ipecac made and preserved in this manner will keep for years. It is given as an emetic in doses of $\frac{1}{2}$ to 1 teaspoonful, repeated in 15 minutes if necessary, and is used as an expectorant in cough remedies.

As syrup of ipecac kept on the shelf in a stock bottle is liable to "sour," it is better to add to it solution of saccharin, 1 fl.drachm to each pint.

Average dose.—Expectorant, 1 Cc. (15 minims). Emetic, 15 Cc. (4 fl.drachms).

SYRUPUS KRAMERIÆ. U. S. Syrup of Krameria.

Fluidextract of Krameria,	450 Cc. or 4½ fl.ounces
Syrup,	550 Cc. or 5½ fl.ounces
To make	1000 Cc. or 10 fl.ounces
Mix them. Average dose.—4 Cc. (1 fl.drachm).	

SYRUPUS LACTUCARII. U. S. Syrup of Lactucarium.

Tincture of Lactucarium,	100 Cc. or 1 fl.ounce
Glycerin,	200 Cc. or 2 fl.ounces
Citric Acid,	1 Gm. or 4½ fl.drachms
Syrup, a sufficient quantity	
To make	1000 Cc. or 10 fl.ounces

The tincture of lactucarium is to be mixed with the glycerin, the orange flower water in which the citric acid has been dissolved is to be added and the mixture filtered if necessary. Finally, a sufficient quantity of syrup is to be added to make the product measure 1000 Cc. (or 10 fl.ounces) and mixed thoroughly.

Average dose.—8 Cc. (2 fl.drachms).

SYRUPUS LIMONIS. Br. Syrup of Lemon.

Fresh Lemon Peel, grated,	20 Gm. or 1 ounce
Lemon Juice,	500 Cc. or 25 fl.ounces
Refined Sugar,	760 Gm. or 38 ounces
Alcohol, (90%), a sufficient quantity.	

"Macerate the lemon peel in $1\frac{1}{2}$ fl.ounces (or 30 Cc.) of the alcohol for 7 days; press; filter; add sufficient of the alcohol to produce 2 fl.ounces (or 40 Cc.). In the lemon juice, cleared by subsidence, dissolve the refined sugar by the aid of gentle heat. When the resulting syrup is cold mix with it 2 fl.ounces (or 40 Cc.) of alcoholic liquid. The product should weigh 4 pounds and 1 ounce (or 1300 Gm.). Dose, $\frac{1}{2}$ to 1 fl.drachm)." <Br.

In the U. S. P. syrup of lemon, which was formerly official, has been replaced by syrup of citric acid, which see.

SYRUPUS PICIS LIQUIDÆ. U. S. Syrup of Tar.

Tar,	5 Gm. or 77 grains
Alcohol,	50 Cc. or $1\frac{3}{4}$ fl.ounces
Magnesium Carbonate,	10 Gm. or 154 grains
Sugar,	850 Gm. or 30 ounces av.
Water, a sufficient quantity	

To make 1000 Cc. or $33\frac{3}{4}$ fl.ounces

The tar is to be mixed intimately in a mortar with 10 Gm. (or 154 grains) of clean white sand, and 100 Cc. (or $3\frac{1}{3}$ fl.ounces) of water is to be worked with the mass and the water poured off and thrown away. The residue is to be treated with alcohol and when the tar is dissolved the magnesium carbonate is to be added and 50 Gm. (or $1\frac{3}{4}$ ounces) of the sugar and after thoroughly triturating them together 400 Cc. (or $13\frac{1}{2}$ fl.ounces) of water is to be added. The mixture is to be stirred occasionally during 2 hours and then filtered. The remainder of the sugar is to be dissolved in the filtered liquid by gentle heat; the syrup is to be strained and enough water added through the strainer to make the product measure 1000 Cc. (or $33\frac{3}{4}$ fl.ounces).

Average dose.—4 Cc. (1 fl.drachm).

Made by Water-Bath Percolation. (Fenner's Formula).

Tar,	2 ounces av.
Cold Water,	4 fl.ounces
Pine Sawdust,	12 ounces av.
Sugar, granulated,	12 ounces av.
Boiling Water, a sufficient quantity.	

Pour the cold water upon the tar and stir the mixture occasionally during 24 hours; then pour off the water and mix the tar intimately with the pine sawdust and pack firmly in the water-bath percolator. Pour upon it a pint of boiling water and keep at a moderate heat for 2

hours, then pour on more boiling water and begin to percolate, adding water and continuing the percolation until 20 ounces have passed. Allow the percolate to stand until cool, then filter off a pint and dissolve the sugar in the filtrate, by agitation or percolation. This is much used in cough mixtures etc.

SYRUPUS PRUNI VIRGINIANÆ. U. S., Br.

Syrup of Wild Cherry. U. S. Syrup of Virginian Prune. Br.

The U. S. formula is:

Wild Cherry, No. 20 powder,	150 Gm. or 7½ ounces av.
Sugar,	700 Gm. or 35 ounces av.
Glycerin,	150 Cc. or 7¼ fl.ounces
Water, q. s. to make	1000 Cc. or 48 fl.ounces

The glycerin is to be mixed with 300 Cc. (or 15 ounces) of water, and the wild cherry moistened with a sufficient quantity of the mixture and macerated for 24 hours in a covered vessel. It is then to be packed firmly in a percolator, the remainder of the menstruum poured upon it and when it has disappeared from the surface, followed by the water until 450 Cc. (or 22 ounces) of the percolate is obtained. The sugar is to be dissolved by agitation in this liquid; the syrup is then to be strained and enough water passed through the strainer to make the measure 1000 Cc. (or 48 fl.ounces). It may also be prepared by percolating the sugar with the liquid as directed under Syrupus. <U. S.

The Br. P. formula is:

Virginian Prune Bark, in No. 20 powder,	150 Gm. or 3 ounces
Refined Sugar,	750 Gm. or 15 ounces
Glycerin,	62.5 Gm. or 1¼ fl.ounces
Distilled Water, a sufficient quantity.	

"Moisten the Virginian prune bark with the distilled water; set aside for 24 hours in a closed vessel; pack in a percolator; gradually add distilled water until a quantity of 9 fl.ounces (or 450 Cc.) of percolate has been collected; dissolve the refined sugar in the liquid by agitation, without heat; add the glycerin; strain; pour sufficient distilled water over the strainer to produce 20 fl.ounces (or 1000 Cc.) of the syrup. Dose, ½ to 1 fl.drachm." <Br.

Made by Water-Bath Percolation.

Wild Cherry, in No. 20 powder,	5½ ounces av.
Sugar, granulated,	28 ounces av.
Glycerin,	2 fl.ounces
Water, sufficient to make	2 pints

Moisten the wild cherry with 6 ounces of water and allow it to stand in a warm place for 24 hours in a covered vessel; then pack in the water-bath percolator, pour a pint of water upon it and heat very

moderately, not over 100°F., for 1 hour, then begin to percolate, and continue the heat and percolation, adding water to the drug if necessary, until 14 fl.ounces have passed, dissolve the sugar in the percolate while still warm, and add the glycerin. Keep in small, well-stoppered bottles in a cool place. Prepared and preserved in this manner this syrup will keep through the summer.

As syrup of Wild Cherry is quite liable to "sour" it is of advantage to add solution of saccharin 1 fl.drachm to each pint of the finished syrup.

SYRUPUS RHEI. U. S., Br. Syrup of Rhubarb.

The U. S. P. formula is:

Fluidextract of Rhubarb,	100 Cc. or 3 fl.ounces
Spirit of Cinnamon,	4 Cc. or 55 minims
Potassium Carbonate,	10 Gm. or 137 grains
Water,	50 Cc. or 1½ fl.ounces
Syrup, sufficient to make	1000 Cc. or 30 fl.ounces

The spirit of cinnamon is to be mixed with the fluidextract and the potassium carbonate dissolved in the water and added to the mixture. Then enough syrup is to be added to make the measure 1000 Cc. (or 30 fl.ounces). <U. S.

The Br. P. formula is:

Rhubarb, in No. 20 powder,	50 Gm. or 2 ounces
Coriander, in No. 25 powder,	50 Gm. or 2 ounces
Refined Sugar,	600 Gm. or 24 ounces
Alcohol, (90%),	200 Cc. or 8 fl.ounces
Distilled Water,	600 Cc. or 24 fl.ounces

"Moisten the mixed rhubarb root and coriander fruit with a portion of the mixed alcohol and distilled water, and set aside; pack in a percolator; pass the remainder of the diluted alcohol slowly through the materials; evaporate the percolate until it is reduced to 14 fl.ounces (or 350 Cc.) and in this after it has been filtered, dissolve the refined sugar by the aid of heat. The product should weigh nearly 2½ pounds (or 1000 Gm.). Dose, ½ to 2 fl.drachms."<Br.

SYRUPUS RHEI AROMATICUS. U. S.

Aromatic Syrup of Rhubarb.

Aromatic Tincture of Rhubarb,	150 Cc. or 3 fl.ounces
Potassium Carbonate,	1 Gm. or 9 grains
Syrup,	850 Cc. or 17 fl.ounces
To make	1000 Cc. or 20 fl.ounces

"Dissolve the potassium carbonate in the aromatic tincture of rhubarb; filtering if necessary, and add sufficient syrup to make the product measure 1000 Cc. (or 20 fl.ounces). Mix thoroughly."<U. S.
Average dose.—8 Cc. (2 fl.drachms).

SYRUPUS RHŒADOS. Br. Syrup of Red Poppy.

Red-Poppy Petals,	260 Gm. or 13 ounces
Refined Sugar,	720 Gm. or 2¼ pounds
Alcohol, (90%),	50 Cc. or 2½ fl.ounces
Distilled Water, a sufficient quantity.	

"Add the red-poppy petals gradually to 20 ounces (or 400 Cc.) of distilled water kept hot upon a water-bath; stir frequently, and afterwards, the vessel being removed, diffuse during 12 hours. Press out the liquid, strain, add the refined sugar and dissolve by the aid of heat. When nearly cold, add the alcohol, and sufficient distilled water to produce 3 pounds and 10 ounces (or 1160 Gm.) of the syrup. Dose, ½ to 1 fl.drachm." <Br.

SYRUPUS ROSÆ. U. S., Br.**Syrup of Rose.** U. S. **Syrup of Roses.** Br.

The U. S. P. formula is:

Fluidextract of Rose,	125 Cc. or 2½ fl.ounces
Diluted Sulphuric Acid,	10 Cc. or 1½ fl.drachms
Sugar,	750 Gm. or 15 ounces av.
Water, sufficient to make	1000 Cc. or 20 fl.ounces

"Mix the fluidextract of rose and diluted sulphuric acid with 300 Cc. (or 6 fl.ounces) of water; after allowing the mixture to stand 2 hours, filter, and dissolve the sugar in the clear filtrate by agitation. Finally add a sufficient quantity of water to make the product measure 1000 Cc. (or 20 fl.ounces). Strain if necessary." <U. S.

The Br. P. formula is:

Dried Red Rose Petals,	50 Gm. or 2 ounces
Refined Sugar,	750 Gm. or 30 ounces
Boiling Distilled Water,	500 Cc. or 20 ounces

Infuse the red rose petals in the distilled water for 2 hours, strain, press, heat the liquid to the boiling point, filter, dissolve the refined sugar in the liquid by the aid of heat. The product should weigh 2 pounds 14 ounces (or 1150 Gm.). Dose, ½ to 2 fl.drachms." <Br.

SYRUPUS RUBI. U. S. Syrup of Rubus. [Blackberry].

Fluidextract of Rubus,	250 Cc. or 1 fl.ounce
Syrup,	750 Cc. or 3 fl.ounces

They are to be well mixed. <U. S.

This is used as an astringent for diarrhœa etc.

Average dose.—4 Cc. (1 fl.drachm).

SYRUPUS RUBI IDÆI. Syrup of Raspberry.

This was official in the 7th revision of the U. S. P. but is dismissed from the 8th. A similar syrup is official in most countries.

Fresh, Ripe Red Raspberries, any convenient quantity.

Sugar, a sufficient quantity.

The raspberries are to be reduced to a pulp and allowed to stand at a temperature of about 20°C. (68°F.) until a small portion of the filtered juice mixes clear with half its volume of alcohol. The juice is then to be separated by pressure and set aside in a cool place until the liquid portion has become clear, and then it is to be filtered, and to every 40 parts, by weight, of the filtrate 60 parts of sugar is to be added, the mixture heated to boiling and strained. The sugar should be added as soon as possible after the juice is filtered, and no metallic vessel should be employed; stone-ware crocks or granite-ware vessels should be used, and, when made, the syrup should be kept in well-filled and well-stoppered small bottles in a cool place.

This was evidently given as a representative formula for fruit syrups. Other fruit syrups may be prepared in a similar manner.

SYRUPUS SARSAPARILLÆ COMPOSITUS. U. S.

Compound Syrup of Sarsaparilla.

Fluidextract of Sarsaparilla,	200	Cc. or	6¾ fl.ounces
Fluidextract of Glycyrrhiza,	15	Cc. or	½ fl.ounce
Fluidextract of Senna,	15	Cc. or	½ fl.ounce
Oil of Sassafras,	0.2	Cc. or	4 minims
Oil of Anise,	0.2	Cc. or	4 minims
Oil of Gaultheria,	0.2	Cc. or	4 minims
Sugar,	650	Gm. or	23 ounces av.
Water, sufficient to make	1000	Cc. or	34 fl.ounces

The fluidextracts are to be mixed and the oils added. Enough water is then to be added to the mixture to make the measure 600 Cc. (or 20 fl.ounces); the mixture is to be well shaken and, after standing an hour, filtered; the sugar dissolved in the filtrate by the aid of gentle heat and the syrup strained, adding enough water through the strainer to make the product measure 1000 Cc. (or 34 fl.ounces). <U. S.

Average dose.—16 Cc. (4 fl.drachms).

It is the custom with many druggists to prepare their syrup sarsaparilla compound from the fluidextract of sarsaparilla compound, either made by themselves or bought of manufacturers, but it will be seen by comparing the formulas that the resultant preparation will not be like the official syrup; manufacturers, therefore make a fluidextract "For Syrup Sarsaparilla Compound."

Made by Water-Bath Percolation.

Sarsaparilla, in No. 30 powder,	25	ounces av.
Guaicum Wood, in No. 30 powder,	3	ounces av.
Pale Rose,	2	ounces av.
Licorice Root, in No. 30 powder,	2	ounces av.
Senna, in No. 30 powder,	2	ounces av.
Sassafras, in No. 30 powder,	1	ounce av.

Anise, in No. 30 powder,	1 ounce av.
Sarsaparilla Flavoring, (see below),	$\frac{1}{2}$ fl.ounce
Sugar, in coarse powder,	$6\frac{1}{8}$ pounds
Water, Diluted Alcohol, each a sufficient quantity.	

Mix the solid ingredients, except the sugar, and moisten them with $1\frac{1}{2}$ pints of diluted alcohol, set in a covered vessel in a warm place for 12 hours, then transfer to a water-bath percolator, pack moderately, and after 1 hour begin to percolate, adding diluted alcohol to the drugs and continuing the heat and percolation until 6 pints of the tincture have passed. Distil off 3 pints of alcohol by means of the water-bath and still, add a pint of water to the residue and filter, adding enough water through the filter to make the measure 4 pints. Mix the sarsaparilla flavoring with 4 ounces of the sugar and dissolve this with the remainder of the sugar in the liquid by percolation or agitation.

Sarsaparilla Flavoring or **Essence of Sarsaparilla** is the same as is used for flavoring soda water syrups, and is made as follows:

Oil of Wintergreen,	4 fl.drachms
Oil of Sassafras,	3 fl.drachms
Oil of Anise,	1 fl.drachm
Cologne Spirit,	12 fl.ounces
Water,	4 fl.ounces

Mix, and if necessary filter through a little magnesium carbonate.

SYRUPUS SCILLÆ. U. S., Br. Syrup of Squill.

The U. S. P. formula is:

Vinegar of Squill,	450 Cc. or $15\frac{1}{4}$ fl.ounces
Sugar, in coarse powder,	800 Gm. or $28\frac{1}{4}$ ounces av.
Water, sufficient to make	1000 Cc. or 34 fl.ounces

"Dissolve the sugar in the vinegar of squill with the aid of gentle heat, then strain, and, when the strained liquid is cold, add enough water through the strainer, to make the product measure 1000 Cc. (or 34 fl.ounces)." < U. S.

Average dose.—2 Cc. (30 minims).

The Br. P. formula is:

Vinegar of Squill,	500 Cc. or 20 fl.ounces
Refined Sugar,	950 Gm. or 38 ounces

"Dissolve the refined sugar in the vinegar of squill by means of gentle heat. The product should weigh 3 pounds 10 ounces. Dose, $\frac{1}{2}$ to 1 fl.drachm." < Br.

SYRUPUS SCILLÆ COMPOSITUS. U. S.

Compound Syrup of Squill. [Hive Syrup].

Fluidextract of Squill,	80 Cc. or $2\frac{3}{4}$ fl.ounces
Fluidextract of Senega,	80 Cc. or $2\frac{3}{4}$ fl.ounces

Antimony and Potassium Tart.,	2 Gm. or	31 grains
Precip. Calcium Phosphate,	10 Gm. or	154 grains
Sugar,	750 Gm. or	26½ ounces av.
Water, sufficient to make	1000 Cc. or	34 fl.ounces

The fluidextracts are to be mixed and evaporated in a tared capsule on a water-bath to 100 Gm. (or 3½ ounces av.). The residue is to be mixed with 350 Cc. (or 12 fl.ounces) of water. When cold the precipitated calcium phosphate is to be added and well mixed, and the mixture filtered, passing enough water through the filter to make the measure 400 Cc. (or 13½ fl.ounces). The antimony and potassium tartrate is to be dissolved in 25 Cc. (or about 1 ounce) of hot water and added to the filtrate. In this liquid the sugar is then to be dissolved by agitation, without heat, and the syrup strained, adding through the strainer enough water to make the product measure 1000 Cc. (or 34 fl.ounces). <U. S.

Average dose.—2 Cc. (30 minims).

Made by Water-Bath Percolation.

Squill, in No. 20 powder,	2½ ounces av.
Senega, in No. 20 powder,	2½ ounces av.
Antimony and Potassium Tartrate,	32 grains
Sugar,	28 ounces av.
Diluted Alcohol,	

Water, of each, a sufficient quantity.

Mix the squill and senega, moisten with 5 fl.ounces of diluted alcohol and set in a covered vessel for 12 hours; then transfer to the water-bath percolator, pack very moderately; heat very moderately, and after 1 hour begin to percolate, adding water to the drug and continuing the heat and percolation until a pint and a half of the percolate has passed. Distil off 12 fl.ounces of alcohol, and boil the residue for 15 minutes; then evaporate it to half a pint and filter, adding enough water through the filter to make 15 fl.ounces. In this dissolve the sugar by percolation or agitation, and having dissolved the antimony and potassium tartrate in an ounce of hot water, add to the syrup and mix thoroughly.

This is much used as a cough syrup and emetic, in doses of ½ to a teaspoonful or more. It is commonly known as "Hive Syrup."

SYRUPUS SENEGÆ. U. S. Syrup of Senega.

Fluidextract of Senega,	200 Cc. or	2 fl.ounces
Syrup,	800 Cc. or	8 fl.ounces
To make	1000 Cc. or	10 fl.ounces

Mix them. <U. S. Average dose.—4 Cc. (1 fl.drachm).

Made by Water-Bath Percolation.

Senega, in No. 40 powder,	6 ounces av.
Diluted Alcohol,	1 pint

Ammonia Water,	1½ fl.drachms
Sugar,	28 ounces av.
Water, a sufficient quantity.	

Moisten the drug with 8 fl.ounces of diluted alcohol and let stand for 12 hours, then pack moderately in the water-bath percolator; pour upon it the remainder (8 fl.ounces) of the diluted alcohol and set in a warm place for 1 day; then heat very moderately, and after 1 hour begin to percolate, adding water to the drug and continuing the heat and percolation until a pint of the tincture has passed; boil this for 15 minutes to coagulate the albumen and starchy matter, continue the evaporation by gentle heat until the liquid is reduced to half a pint, and filter through muslin without pressure, adding a little water through the filter to preserve the measure. To the filtered liquid add 8 ounces of water and the ammonia water, and, after standing 3 or 4 hours, filter through paper and dissolve the sugar in the filtrate by agitation or percolation.

This is a tonic expectorant much esteemed in cough mixtures. Dose, ½ to 1 fl.drachm.

As syrup of senega is liable to "sour" in the summer, it is best to add solution of saccharin, 1 fl.drachm to each pint.

SYRUPUS SENNÆ. U. S., Br. Syrup of Senna.

The U. S. P. formula is:

Fluidextract of Senna,	250 Cc. or 2½ fl.ounces
Oil of Coriander,	5 Cc. or 24 minims
Syrup, a sufficient quantity	
To make	1000 Cc. or 10 fl.ounces

"Mix the oil of coriander with the fluidextract of senna and add a sufficient quantity of syrup to make the product measure 1000 Cc. (or 10 fl.ounces). Mix thoroughly." <U. S.

Representing 25% of senna, by volume of fluidextract in the finished syrup.

Average dose.—4 Cc. (1 fl.drachm).

The Br. P. formula is:

Senna,	40 ounces	or	1200 Gm.
Oil of Coriander,	10 minims	or	0.6 Cc.
Alcohol, (90%),	40 minims	or	2.4 Cc.
Refined Sugar, in powder,	50 ounces	or	1500 Gm.
Alcohol, (20%),	70 Imp.fl.oz.	or	2100 Cc.

"Moisten the senna with 40 Imp. fl. ounces (or 1200 Cc.) of the alcohol (20%); pack tightly in a vessel which can afterward be closed; set aside for 3 days; press strongly; reserve the liquid obtained; break up the marc; moisten it with 15 fl.ounces (or 450 Cc.) of the alcohol (20%); set aside for 24 hours; press strongly; add the liquid obtained to the portion previously reserved; break up the marc;

mix it with the remainder of the alcohol (20%); set aside for 3 hours; press again; evaporate the resulting liquid until it is reduced to such a volume that, when added to the reserved liquid the whole shall measure 40 Imp. fl.ounces (or 1200 Cc.). Mix the evaporated liquid with the reserved liquid, heat the product in a covered vessel to 180°F. (82.2°C.) for a few minutes; set aside for 24 hours; filter; pass through the filter distilled water until the filtrate measures 40 Imp. fl.ounces (or 1200 Cc.)" <Br.

[So far this makes a fluidextract the same as is contemplated in the U. S. P. formula. To this fluidextract or liquidextract thus prepared]

"Add the refined sugar and dissolve in a covered vessel by the aid of gentle heat; cool; add the oil of coriander dissolved in the alcohol (90%). Shake well. The product should weigh 5¾ lbs. av. (or 2760 Gm.). Dose, ½ to 2 fl.drachms." <Br. Representing 50 percent. of senna in the finished syrup.

SYRUPUS TOLUTANUS. U. S., Br. Syrup of Tolu.

Syrup of Balsam of Tolu. Br.

The U. S. P. formula is:

Tincture of Tolu,	50 Cc. or 1¾ fl.ounces
Magnesium Carbonate,	10 Gm. or 154 grains
Sugar,	820 Gm. or 28⅞ ounces av.
Water, sufficient to make	1000 Cc. or 33¾ fl.ounces

"Rub the tincture of tolu in a mortar with the magnesium carbonate and 60 Gm. (or 2 ounces) of the sugar. Then gradually add 450 Cc. (or 15 fl.ounces) of water, with constant trituration and filter. Dissolve the remainder of the sugar in the clear filtrate, with the aid of a gentle heat; strain the syrup while hot and add a sufficient quantity of water to make the product measure 1000 Cc. (or 33¾ fl.ounces)." <U. S.

This syrup may be made by percolation in the same manner as is directed for other syrups made by percolation.

Average dose.—16 Cc. (4 fl.drachms).

The Br. P. formula is:

Balsam of Tolu,	62.5 Gm. or 1¼ ounces
Refined Sugar,	1600 Gm. or 32 ounces
Distilled Water,	a sufficient quantity.

"Boil the balsam of tolu in 1 pint (or 1000 Cc.) of the distilled water for half an hour in a lightly covered vessel, stirring frequently. Remove from the source of heat and add distilled water, if necessary, so that the liquid when cold shall measure 16 fl.ounces (or 800 Cc.). Filter the solution, add the refined sugar, and dissolve by the aid of a water-bath. The product should weigh 3 pounds (or 2400 Gm.). Dose, ½ to 1 fl.drachm." <Br.

SYRUPUS ZINGIBERIS. U. S., Br. Syrup of Ginger.

The U. S. P. formula is:

Fluidextract of Ginger,	30 Cc. or	1 fl.ounce
Alcohol,	20 Cc. or	$\frac{3}{4}$ fl.ounce
Magnesium Carbonate,	10 Gm. or	154 grains
Sugar,	820 Gm. or	28 $\frac{3}{4}$ ounces av.
Water, sufficient to make	1000 Cc. or	33 $\frac{1}{2}$ fl.ounces

"Mix the fluidextract of ginger and the alcohol, then triturate the liquid in a mortar with the magnesium carbonate and 60 Gm. (or 2 ounces) of the sugar. Then gradually add 450 Cc. (or 15 fl.ounces) of water, with constant trituration, and filter. Dissolve the remainder of the sugar in the clear filtrate, with the aid of a gentle heat; strain the syrup while hot, and add a sufficient quantity of water to make the product measure 1000 Cc. (or 33 $\frac{1}{2}$ fl.ounces)." <U. S.

This may also be prepared by percolation in the same manner as other syrups which are made by percolation.

Average dose.—16 Cc. (4 fl.drachms).

The Br. P. formula is:

Ginger, in fine powder,	12.5 Gm. or $\frac{1}{2}$ ounce
Alcohol, (90%),	
Syrup, of each, a sufficient quantity.	

"Prepare 1 fl.ounce (or 25 Cc.) of a strong tincture of the ginger by the process of percolation with the alcohol. To this add sufficient of the syrup to produce 20 fl.ounces (or 500 Cc.) of the syrup of ginger. Dose, $\frac{1}{2}$ to 1 fl.drachm." <Br.

UNOFFICIAL SYRUPS.

Besides the foregoing syrups official in the U. S. and Br. pharmacopœias, a great many not official in these authorities or unofficial altogether are much used. These include the syrups of vegetable substance which are popular or convenient; the syrups of chemical substances; syrups used for soda water and other beverages, and a great variety of other syrups which have been introduced into medicine and pharmacy because of their utility or application. The following are those more commonly used:

SYRUPS OF CHEMICAL SUBSTANCES.

The following are unofficial syrups prepared from chemical substances, for which there is a demand in this country, most of them being known as "elegant pharmaceutical preparations." They are, therefore, given more prominence than other unofficial syrups.

As the commercial title of these syrups generally has the name of the basic substance or substances following the acid with which it is combined, they are so given in the formulas which follow, although it is at present customary in official preparations to reverse the order.

Flavored Syrup.

For making syrups of chemical substances as well as for other uses, a flavored simple syrup, which may be used in the same manner as the official simple syrup is desirable. The following will be found suitable for this purpose:

Elixir Flavoring,	1 fl.ounce
Magnesium Carbonate,	$\frac{1}{2}$ ounce av.
Water,	4 pints
Sugar,	8 pounds

Rub the elixir flavoring with the magnesium carbonate in a mortar, add about one-third of the water gradually, and rub them well together; add the mixture to the remainder of the water; put in a 6 pint bottle, well-stoppered, and heat for an hour on a water-bath to about 60°C. (167°F.), and after standing a day or two, filter and dissolve the sugar in the filtrate by percolation or agitation.

Syrup Bromide of Iron (Tasteless).

Besides the official syrup Bromide of Iron, a so-called tasteless syrup is made as follows:

Ferrous Bromide,	384 grains
Potassium Citrate,	$1\frac{1}{2}$ ounces av.
Soluble Flavoring,	1 fl.ounce
Water,	7 fl.ounces
Sugar,	16 ounces av.

Dissolve the potassium citrate in the water, add the iron bromide and then the soluble flavoring and filter. Dissolve the sugar in the filtrate.

A fl.drachm contains 3 grains iron bromide. Dose, 20 to 60 minims.

Syrup Bromide of Morphine.

Morphine Bromide,	16 grains
Flavored Syrup,	1 pint

Dissolve the morphine salt in $\frac{1}{4}$ ounce of warm water, and add to the syrup.

A fl.drachm contains $\frac{1}{8}$ grain morphine bromide. Dose, a teaspoonful.

Syrup Bromide of Quinine, Morphine and Strychnine.

Morphine Bromide,	16 grains
Solution of Strychnine,	2 fl.drachms
Syrup Bromide of Quinine,	1 pint

Dissolve the morphine salt in $\frac{1}{4}$ ounce of hot water, and add the solution with the solution of strychnine to the syrup.

A fl.drachm contains 1 grain quinine bromide, $\frac{1}{8}$ grain morphine bromide, and $\frac{1}{64}$ grain strychnine. Dose, a teaspoonful.

Syrup Bromide of Quinine.

Quinine Bromide,	128 grains
Water,	8 fl.ounces
Soluble Flavoring,	1 fl.ounce
Sugar,	16 ounces av.

Dissolve the quinine bromide in the water by the aid of gentle heat, add the flavoring and dissolve the sugar in the solution.

A fl.drachm contains 1 grain quinine bromide. Dose, a teaspoonful.

Syrup Bromide of Quinine and Morphine.

Morphine Bromide,	16 grains
Syrup Bromide of Quinine,	16 fl.ounces

Dissolve the morphine bromide in $\frac{1}{4}$ ounce of hot water and add to the syrup.

A fl.drachm contains 1 grain quinine bromide, $\frac{1}{8}$ grain morphine bromide. Dose, a teaspoonful.

Syrup Bromide of Sodium.

Sodium Bromide,	640 grains
Soluble Flavoring,	1 fl.ounce
Water,	8 fl.ounces
Sugar,	16 ounces av.

Dissolve the salt in the water, add the flavoring and dissolve the sugar in the solution.

A fl.drachm contains 5 grains of the sodium salt. Dose, a teaspoonful to a tablespoonful.

Syrups of other bromides, as Syrup Bromide of Potassium, Syrup Bromide of Ammonium etc., may be made in the same manner.

Syrup Bromide of Strychnine.

Strychnine Bromide,	4 grains
Flavored Syrup,	1 pint

Dissolve the strychnine in $\frac{1}{2}$ fl.ounce of boiling water and add to the syrup.

A fl.drachm contains $\frac{1}{32}$ grain of strychnine salt. Dose, a teaspoonful.

Syrup Bromide of Strychnine and Morphine.

Strychnine Bromide,	4 grains
Morphine Bromide,	16 grains
Flavored Syrup,	1 pint

Dissolve the bromides in $\frac{1}{2}$ ounce of boiling water and add to the syrup.

A fl.drachm contains $\frac{1}{32}$ grain strychnine and $\frac{1}{8}$ grain morphine bromides. Dose, a teaspoonful.

Syrup Bromide of Strychnine, Iron and Quinine.

Strychnine Bromide,	2 grains
Quinine Bromide,	128 grains
Ferrous Bromide,	256 grains
Potassium Citrate,	256 grains
Soluble Flavoring,	1 fl.ounce
Water,	7 fl.ounces
Sugar,	16 ounces av.

Syrup Glycerinophosphates Compound.

Calcium Glycerinophosphate,	128 grains
Sodium Glycerinophosphate,	256 grains
Soluble Phosphate of Iron,	24 grains
Manganese Phosphate,	16 grains
Quinine Sulphate,	8 grains
Strychnine Sulphate,	1 grain
Glycerinophosphoric Acid,	2 fl.drachms
Glycerin,	4 fl.ounces
Syrup, sufficient to make	16 fl.ounces

Dissolve the chemical salts by rubbing with the glycerin, previously warmed and mixed with the acid, then add sufficient syrup to make the measure 16 fl.ounces. Dose a teaspoonful to a dessertspoonful.

Syrup Heroin Compound.

Heroin,	8 grains
Glycerin,	4 fl.ounces
Syrup Tolu,	12 fl.ounces

Rub the heroin with portions of the glycerin until dissolved and add the syrup tolu. Dose a teaspoonful.

Dissolve the potassium citrate in the water, add the iron salt, then the bromides, and dissolve by gentle heat, then add the flavoring and sugar.

A fl.drachm represents 2 grain bromide of iron, 1 grain quinine bromide, and $\frac{1}{64}$ grain strychnine bromide. Dose, a teaspoonful.

Syrup Chloride of Iron. "Weld's Syrup."

Solution of Ferric Chloride,	1½ fl.drachms
Citric Acid, crystals,	70 grains
Sodium Carbonate, crystals,	120 grains
Glycerin,	1 ounce
Sugar,	12 ounces
Water,	16 fl.ounces

Rub the citric acid with 6 ounces of water, and add to it sodium carbonate in crystals; allow to stand until effervescence ceases, then add the glycerin and iron solution, and after standing a few days filter;

dissolve the sugar by agitation and add to the filtered liquid, and water enough to make the measure 16 fl.ounces.

Syrup Citrate of Iron.

Iron and Ammonium Citrate,	256 grains
Hot Water,	1 fl.ounce
Flavored Syrup,	15 fl.ounces

Dissolve the iron salt in the water and add the syrup.

A fl.drachm contains 2 grains of the iron salt. The dose is a teaspoonful or two.

Syrup Citrate of Iron and Quinine.

Iron and Quinine Citrate,	256 grains
Hot Water,	1 fl.ounce
Flavored Syrup, sufficient to make	1 pint

Dissolve the salt in the water and add to the syrup.

A fl.drachm contains 2 grains iron and quinine citrate. The dose is a teaspoonful.

Syrup Citrate of Iron, Quinine and Strychnine.

Solution of Strychnine,	1 fl.drachm
Syrup Citrate of Iron and Quinine,	1 pint

Mix them thoroughly. A fl.drachm contains 2 grains iron and quinine and $\frac{1}{128}$ grain strychnine. The dose is a teaspoonful.

Syrup Citrate of Iron and Strychnine.

Iron and Strychnine Citrate,	256 grains
Hot Water,	1 fl.ounce
Flavored Syrup,	1 pint

Dissolve the salt in the hot water and add the syrup.

A fl.drachm contains 2 grains of the iron and strychnine citrate. Dose, a teaspoonful.

Syrup Dialysed Iron.

Solution Dialysed Iron,	640 minims
Flavored Syrup, to make	1 pint

Mix them. A fl.drachm contains 5 minims solution dialysed iron. The dose is a teaspoonful to a dessertspoonful.

Syrup Hypophosphite of Calcium (Lime).

Calcium Hypophosphite,	384 grains
Water,	8 fl.ounces
Soluble Flavoring,	1 fl.ounce
Sugar,	16 fl.ounces

Rub the salt to a powder and triturate in a mortar with the water until dissolved, add the soluble flavoring, filter, and dissolve the sugar in the filtrate without heat.

A fl.drachm contains 3 grains calcium hypophosphite. The dose is a teaspoonful to a dessertspoonful.

Syrup Hypophosphite of Calcium, Sodium and Potassium.

Compound Syrup of Hypophosphites.

Calcium Hypophosphite,	256 grains
Sodium Hypophosphite,	128 grains
Potassium Hypophosphite,	64 grains
Water,	8 fl.ounces
Soluble Flavoring,	1 fl.ounce
Sugar,	16 ounces av.

Rub the salts to a fine powder and then with the water until dissolved, add the flavoring, filter, and dissolve the sugar in the filtrate without heat.

Syrup Hypophosphites of Calcium, Sodium, Potassium and Iron.

Syrup Hypophosphite Lime, Soda, Potassa and Iron

Solution Hypophosphite of Iron,	1 fl.ounce
Syrup Hypophosphites Compound,	15 fl.ounces

Mix them. A fl.drachm contains about $4\frac{1}{2}$ grains of mixed hypophosphites. The dose is a teaspoonful to a dessertspoonful.

Syrup Hypophosphite of Calcium and Sodium.

Calcium Hypophosphite,	384 grains
Sodium Hypophosphite,	256 grains
Water,	8 fl.ounces
Soluble Flavoring,	1 fl.ounce
Sugar,	16 ounces av.

Rub the salts to a fine powder and dissolve by rubbing with the water, add the flavoring and filter, and dissolve the sugar in the filtrate without heat.

A fl.drachm contains 5 grains of the hypophosphites. The dose is a teaspoonful to a dessertspoonful.

Syrup Hypophosphite of Iron.

Solution Hypophosphite of Iron,	1 fl.ounce
Flavored Syrup,	15 fl.ounces

Mix them. A fl.drachm contains 1 grain iron hypophosphite. Dose, a teaspoonful or more.

Syrup Hypophosphite of Iron and Calcium.

Solution Hypophosphite of Iron,	1 fl.ounce
Syrup Hypophosphite of Calcium,	15 fl.ounces

Mix them. A fl.drachm contains 1 grain of iron and about 3 grains of calcium hypophosphite. Dose, a teaspoonful or more,

Syrup Hypophosphite of Iron and Manganese.

Solution Hypophosphite of Iron,	1 fl.ounce
Solution Hypophosphite of Manganese,	1 fl.ounce
Flavored Syrup,	14 fl.ounces

Mix them. A fl.drachm contains 1 grain each of the hypophosphites of iron and manganese. Dose, a teaspoonful or more.

Syrup Hypophosphite of Manganese.

Solution Hypophosphite of Manganese,	1 fl.ounce
Flavored Syrup,	15 fl.ounces

Mix them. A fl.drachm contains 1 grain of manganese hypophosphite. The dose is a teaspoonful or more.

Syrup Hypophosphite of Sodium. Syrup Hypophosphite of Soda.

Sodium Hypophosphite,	256 grains
Hot Water,	1 fl.ounce
Flavored Syrup,	15 fl.ounces

Dissolve the salt in the hot water, strain, mix the solution with the syrup.

A fl.drachm contains 2 grains sodium hypophosphite. The dose is a dessertspoonful or more.

Syrup Hypophosphites Compound with Lactopeptine.

Syrup Hypophosphites Compound,	12 fl.ounces
Lactopeptine,	256 grains
Hypophosphorous Acid,	1 fl.ounce
Water,	3 fl.ounces

Rub the lactopeptine with the water, add the acid and heat gently by water-bath until dissolved; strain the solution and add to the syrup, mixing them thoroughly.

Syrup Hypophosphites Compound with Quinine and Strychnine.

This combination is very popular as a nutritive tonic, and has to a large extent taken the place of other compound syrups of hypophosphites.

Calcium Hypophosphite,	4	ounces av.
Sodium Hypophosphite,	2	ounces av.
Potassium Hypophosphite,	$\frac{1}{4}$	ounce av.
Manganese Hypophosphite,	$\frac{1}{4}$	ounce av.
Soluble Iron Phosphate, in scales,	1	ounce av.
Strychnine Sulphate,	8	grains
Quinine Sulphate,	$\frac{1}{2}$	ounce av.
Citric Acid,	40	grains
Sugar,	7	pounds
Water, sufficient to make	1	gallon

Dissolve the citric acid in 8 fl.ounces of water, and rub the strychnine in a mortar with the solution until dissolved, then add the quinine to the solution and, having transferred to a bottle, add 3 pints more of water. Rub the hypophosphites to a fine powder and add to the solution in the bottle. Dissolve the iron phosphate in 8 fl.ounces of hot water, and add to the solution in the bottle. When all the salts are dissolved, filter the solution and dissolve the sugar in the filtrate, making up the measure to 1 gallon of water. If desired this may be flavored with 4 ounces of soluble flavoring, but as found in the market it is usually without flavor.

This is similar in composition to the proprietary Fellow's Syrup of Hypophosphites Compound. The dose is a teaspoonful to a dessert-spoonful. A fl.drachm contains about 4 grains of the mixed hypophosphites.

Syrup Hypophosphites Compound, Iron, Quinine and Strychnine.

Quinine, (alkaloid),	60 grains
Strychnine, (alkaloid),	1 grain
Solution Hypophosphite of Iron,	1 fl.ounce
Hypophosphorous Acid,	2 fl.drachms
Flavored Syrup,	15 fl.ounces

Dissolve the quinine and strychnine in the hypophosphorous acid by gentle heat and add to the syrup, then add the iron solution.

A fl.drachm contains $\frac{1}{2}$ grain of quinine, 1 grain iron, and $\frac{1}{128}$ grain strychnine. The dose is a teaspoonful to a dessertspoonful.

Syrup Iodide of Calcium. Syrup Iodide of Lime.

Calcium Iodide,	256 grains
Warm Water,	1 fl.ounce
Flavored Syrup,	15 fl.ounces

Dissolve the calcium iodide by rubbing with the water and add the solution to the flavored syrup.

A fl.drachm contains 2 grains calcium iodide. This syrup is given as an alterative in doses of a teaspoonful or more.

Syrup Iodide of Iron (Tasteless).

Tasteless Iodide of Iron,	256 grains
Warm Water,	1 fl.ounce
Flavored Syrup,	15 fl.ounces

Rub the iodide with the water and add the solution to the syrup.

A fl.drachm contains 2 grains of the tasteless iodide of iron. This is given as a tonic and resolvent in doses of a teaspoonful or more. It has not the disagreeable taste of the official syrup iodide of iron.

Syrup Iodide of Iron and Manganese.

Tasteless Iodide of Iron,	128 grains
Iodide of Manganese,	128 grains
Warm Water,	1 fl.ounce
Flavored Syrup,	15 fl.ounces

Rub the iodides with the water, and add the solution to the syrup.

A fl.drachm contains 1 grain each iodide of iron and manganese. The dose is a teaspoonful as a tonic and alterative.

Syrup Iodide of Manganese.

Iodide of Manganese,	256 grains
Warm Water,	1 fl.ounce
Flavored Syrup,	15 fl.ounces

Dissolve the iodide by rubbing with the water, and add the solution to the syrup.

A fl.drachm contains 2 grains iodide of manganese. The dose is a teaspoonful as a tonic.

Syrup Iodide of Starch.

Iodide of Starch,	16 grains
Flavored Syrup,	1 fl.ounce

Rub them well together.

In this the iodide of starch is suspended in the syrup, and it should be shaken when taken or dispensed. A colorless syrup may be made by adding 128 grains sodium thiosulphate, but this produces a syrup of iodide of sodium instead.

The syrup iodide of starch may be given in doses of 1 to 4 fl.drachms.

Syrup of Iron and Sodium Albuminate.**"Nitrogenized Iron."**

Iron Chloride, (the salt),	128 grains
Albumen, (white of egg),	6 fl.ounces
Glycerin,	8 fl.ounces
Solution of Soda, q. s., about	2 fl.ounces

Mix part of the glycerin with the white of egg and dissolve the iron by gentle heat in the remainder; add the solution of iron thus prepared to the mixture of glycerin and albumen, stirring them well together for an hour or two, and forming a semi-solid gelatinous mass; then add the solution of soda gradually, and with constant stirring, until the mass is dissolved and the solution is neutral. Allow to stand a few hours for the froth to subside, then pour off and strain.

In making this preparation it is necessary to have it neutral, which may be determined by testing with litmus paper. If not entirely

liquid after standing a few hours, it will be necessary to add a little more of the solution of soda. This preparation has a bland, sweet taste and a bright color. It is an excellent iron tonic and nutritive, given in doses of a teaspoonful to a tablespoonful, a fl.drachm containing 1 grain of the iron salt.

Syrup Lactate of Iron.

Solution "Protoxide of Iron,"	1 fl.ounce
Lactic Acid,	90 minims
Flavored Syrup,	15 fl.ounces
Mix them. A fl.drachm contains 1 grain lactate of iron.	

Syrup Lactopeptine.

Lactopeptine,	384 grains
Hydrochloric Acid,	1½ fl.drachms
Water,	8 fl.ounces
Soluble Flavoring,	1 fl.ounce
Sugar,	14 fl.ounces

Macerate the lactopeptine in the mixed liquids for 24 hours, with occasional agitation, then strain, and dissolve the sugar in the liquid. It may be colored red if desired.

A fl.drachm contains 3 grains lactopeptine. The dose is a teaspoonful or more.

Syrup Lactated Pepsin. By using the compound pepsin powder instead of lactopeptine in this formula, a very similar preparation may be made at a considerable saving in cost.

Syrup Lactopeptine Compound.

Solution Iron Phosphate,	1 fl.ounce
Solution Phosphate of Calcium,	1 fl.ounce
Sodium Phosphate,	128 grains
Potassium Phosphate,	128 grains
Hydrochloric Acid,	1½ fl.drachm
Lactopeptine,	256 grains
Water,	6½ fl.ounces
Soluble Flavoring,	1 fl.ounce
Sugar,	14 ounces av.

Rub the lactopeptine and the salts together; mix the solutions, add the acid and water, and add the powders to the mixture. Macerate for 24 hours and strain, add the flavoring and dissolve the sugar in the liquid. The dose is a teaspoonful to a dessertspoonful.

Syrup Lactated Pepsin with Phosphates. By using the compound pepsin powder instead of lactopeptine in this formula, a very similar preparation may be made at a considerable saving in cost,

Syrup Lactophosphate of Calcium.

Solution Lactophosphate of Calcium,	2 fl.ounces
Flavored Syrup,	14 fl.ounces

Mix them. A fl.drachm contains 2 grains calcium lactophosphate. The dose is a teaspoonful to a dessertspoonful. This is also official under the title *Syrupus Calcii Lactophosphates* (which see).

Syrup Lactophosphate of Calcium and Pepsin.

Syrup Lactophosphate of Calcium,	8 fl.ounces
Syrup Pepsin,	8 fl.ounces

Mix them. A fl.drachm contains about 1 grain calcium lactophosphate and 2 grains of pepsin. The dose is a teaspoonful or more.

Syrup Lactophosphate of Iron.

Solution Lactophosphate of Iron,	1 fl.ounce
Flavored Syrup,	15 fl.ounces

Mix them. A fl.drachm contains 1 grain iron lactophosphate. The dose is a teaspoonful as a tonic.

Syrup Lactophosphate of Iron and Calcium. (Lime).

Solution Lactophosphate of Iron,	$\frac{1}{2}$ fl.ounce
Solution Lactophosphate of Calcium,	1 fl.ounce
Flavored Syrup,	14 $\frac{1}{2}$ fl.ounces

Mix them. A fl.drachm contains $\frac{1}{2}$ grain iron and 1 grain calcium lactophosphate. The dose is a teaspoonful or more.

Syrup Lactophosphate of Manganese.

Solution Lactophosphate of Manganese,	1 fl.ounce
Flavored Syrup,	15 fl.ounces

Mix them. A fl.drachm contains 1 grain manganese lactophosphate. The dose is a teaspoonful to a dessertspoonful as a tonic.

Syrup Lactophosphates Compound.

Solution Lactophosphate of Iron,	$\frac{1}{2}$ fl.ounce
Solution Lactophosphate of Calcium,	1 fl.ounce
Solution Lactophosphate of Manganese,	$\frac{1}{2}$ fl.ounce
Flavored Syrup,	14 fl.ounces

Mix them. A fl.drachm contains $\frac{1}{2}$ grain each iron and manganese lactophosphate, and 1 grain calcium lactophosphate. Dose, a teaspoonful to a dessertspoonful as a tonic.

Syrup Morphine.

This may be made with either the Acetate, Hydrochloride, Sulfate, or other soluble salt of morphine, as follows:

The Morphine Salt,	16 grains
Hot Water,	2 fl.drachms
Flavored Syrup,	1 pint

Dissolve the morphine salt in the hot water and add to the syrup. A fl.drachm contains $\frac{1}{8}$ grain of the salt. The usual dose is a teaspoonful, as an anodyne.

Syrup of Codeine. This may be made in the same proportion and manner as syrup of morphine, only using codeine instead of the morphine salt.

Syrup Muriate of Ammonia. Syrup Ammonium Chloride.

Ammonium Chloride, in powder,	640 grains
Water,	8 fl.ounces
Soluble Flavoring,	1 fl.ounce
Sugar,	16 ounces av.

Dissolve the salt in the water, filter, add the flavoring and dissolve the sugar in the liquid.

A fl.drachm contains 5 grains of the salt. The dose is a teaspoonful or more.

Syrup Nascent Phenic Acid.

Pure Phenol, or Carbolic Acid,	67 grains
Glycerin,	1 fl.ounce
Flavored Syrup,	15 fl.ounces

Rub the acid with the glycerin in a mortar until dissolved, and add to the syrup.

This is somewhat heavier and of a different flavor than the Syrup Pure Nascent Phenic Acid prepared by Déclat Manufacturing Co., New York, but contains the same quantity of acid. If desired like this, use double the quantity of glycerin with 1 ounce of water and plain syrup, flavoring with essence of cognac, 1 fl.drachm. Dose, 1 tablespoonful.

Syrup Pepsin.

Saccharated Pepsin,	1 ounce av.
Hydrochloric Acid,	1 fl.drachm
Water,	8 fl.ounces
Sugar,	16 ounces av.
Soluble Flavoring,	1 fl.ounce

Rub the pepsin with the water and add the acid, let stand until dissolved, strain, add the flavoring, and dissolve the sugar in the liquid without heat.

A fl.drachm contains $3\frac{1}{2}$ grains saccharated pepsin. The dose is a teaspoonful to a dessertspoonful.

Syrup Phosphate of Calcium. Syrup Phosphate of Lime.

Solution Phosphate of Calcium,	2 fl.ounces
Flavored Syrup,	14 fl.ounces

Mix them. A fl.drachm contains 2 grains calcium phosphate. The dose is a teaspoonful or more.

Syrup Phosphate of Iron.

Solution Phosphate of Iron,	1½ fl.ounces
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Flavored Syrup,	14½ fl.ounces
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Mix them. This may also be prepared by dissolving 384 grains of iron phosphate (soluble) in an ounce of boiling water and adding to 14½ fl.ounces of flavored syrup.

A fl.drachm contains 3 grains of iron phosphate. The dose is a teaspoonful or more. This is official in the Br. P. under the title *Syrupus Ferri Phosphatis*, (which see).

Syrup Phosphate of Manganese.

Solution Phosphate of Manganese,	1 fl.ounce
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Flavored Syrup,	15 fl.ounces
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Mix them. A fl.drachm contains 1 grain manganese phosphate. The dose is 1 to 2 teaspoonfuls as a tonic.

Syrup Phosphate of Manganese Compound.

Solution Phosphate of Iron,	½ fl.ounce
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Solution Phosphate of Manganese,	1 fl.ounce
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Sodium Phosphate,	128 grains
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Flavored Syrup,	14 fl.ounces
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Dissolve the sodium salt in half an ounce of hot water and add to the syrup, then add the solutions and mix.

A fl.drachm contains 1 grain each iron, manganese and sodium phosphates. Dose, a teaspoonful or more as a tonic.

Syrup Phosphate of Quinine.

Quinine Sulphate,	128 grains
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Phosphoric Acid, diluted,	½ fl.ounce
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Flavored Syrup,	1 pint
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Dissolve the quinine salt in the acid and add the syrup.

A fl.drachm contains 1 grain of the quinine salt.

Syrup Phosphate of Quinine and Iron.

Quinine Sulphate,	128 grains
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Phosphoric Acid, diluted,	½ fl.ounce
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Solution Phosphate of Iron,	½ fl.ounce
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Flavored Syrup,	15 fl.ounces
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Dissolve the quinine salt in the acid and add to the syrup, mix, then add the iron solution.

A fl.drachm contains 1 grain each of the iron and quinine salts.

Syrup Phosphate of Quinine, Iron and Strychnine.

Syrup Phosphate of Quinine and Iron,	1 pint
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Solution of Strychnine,	2 fl.drachms
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Add the strychnine solution to the syrup and mix them well,

A fl.drachm contains 1 grain each of quinine and iron and $\frac{1}{64}$ grain strychnine. See also the official syrup under the title *Syrupus Ferri, Quininæ et Strychninæ Phosphatum*.

This syrup is known and often prescribed as *Syrup Triple Phosphates*.

Syrup Phosphates Compound. Chemical Food.

Solution of Phosphates Compound,	2 fl.ounces
Flavored Syrup,	14 fl.ounces

Mix and color with red coloring. The dose is a teaspoonful to a dessertspoonful as a tonic and vitalizer.

A fl.drachm contains about $3\frac{1}{2}$ grains of the mixed phosphates in solution, with excess of phosphoric acid.

This syrup has been a very popular preparation. The formula above given is the most convenient, as the solution has only to be mixed with the syrup, the tedious process which was formerly used being avoided. As some may wish to prepare this after the old method, the formula is here given. The following solutions are first made:

Sulphate of Iron,	$1\frac{1}{4}$ fl.ounces
Sodium Phosphate,	$1\frac{3}{4}$ fl.ounces

Dissolve the iron salt in half a gallon of hot water, and mix with 1 gallon of water in an earthen crock or other vessel suitable for precipitating. Dissolve the sodium salt in half a gallon of hot water, and add the solution to that in the jar. Agitate thoroughly and allow to stand for a few hours for the precipitate to subside. Pour off the water, and pour upon the precipitate one gallon of fresh water. Agitate, allow to stand as before, pour off the water, and pour the precipitate upon a cloth strainer to drain. (The object of using the large amount of water in the precipitating jar is to dissolve the sodium sulphate as soon as formed, and save the troublesome washing of the precipitate usually adopted). As soon as the precipitate is drained mix it with

Water,	2 fl.ounces
Sugar,	1 ounce av.
Hydrochloric Acid,	6 fl.drachms

and dissolve. This makes a solution of iron phosphate with hydrochloric acid. Then take of

Calcium Phosphate,	1280 grains
Hydrochloric Acid, q. s., or	4 ounces
Hot Water,	4 ounces

Mix the phosphate of lime with the hot water, and add enough hydrochloric acid to dissolve. (The amount depends upon the strength of the acid). This makes a solution of phosphate of lime with hydrochloric acid.

Then to make the syrup, take the

Solution Phosphate of Iron,	as above
The Solution of Calcium Phosphate,	as above
Diluted Phosphoric Acid,	5 fl.ounces
Extract of Vanilla,	1 fl.ounce
Cochineal, powdered,	$\frac{1}{2}$ ounce av.
Sodium Phosphate,	160 grains
Potassium Phosphate,	80 grains
Water, enough to make	3 pints
Sugar,	$4\frac{1}{2}$ pounds

Mix the solutions of iron and calcium, and add the phosphoric acid. Dissolve the sodium and potassium phosphate in a little hot water, and add to the solutions. Add the vanilla and cochineal, and then water enough to make the measure 3 pints. Allow to stand a few hours to get the color from the cochineal etc., and filter. Dissolve the sugar in the filtrate and strain if necessary.

This makes a beautiful permanent syrup.

Each fl.drachm contains 2 grains calcium phosphate, 1 grain iron phosphate, with fractions of a grain of sodium and potassium phosphate, and an excess of acid. The hydrochloric acid in it is not objectionable and makes the preparation permanent.

Syrup "Protoxide of Iron."

Solution "Protoxide of Iron,"	1 fl.ounce
Flavored Syrup,	15 fl.ounces

Mix them. A fl.drachm contains 1 grain protocitrate of iron. The dose is a dessertspoonful or more.

Syrup Pyrophosphate of Iron.

The syrups of pyrophosphate of iron and combinations for which formulas have been given in previous editions of Fenner's Formulary, are not here repeated for the reason that much more stable preparations are made with the Soluble Iron Phosphate, in scales, having the same properties as the pyrophosphate. They may, however, be made with the pyrophosphate if desired by using the same quantity of that salt as is directed of the soluble iron phosphate in the formula.

Syrup of Quinine. (Tasteless).

Quinine, (alkaloid),	256 grains
Solution of Saccharin,	2 fl.drachms
Flavored Syrup, sufficient to make	1 pint

Rub the quinine to a fine powder in a mortar, and then with separate portions of the flavored syrup, and add the solution of saccharin and enough flavored syrup to make a pint.

This is to be shaken before dispensing and before taking, the alkaloid quinine being very insoluble, is tasteless, but is decomposed in the stomach, and is therefore effective.

A fl.drachm contains 2 grains of quinine. A syrup containing 5 grains of quinine in a fl.drachm may be made in the same manner, by taking 640 grains of quinine with the other ingredients of the formula.

Syrup of Terebene. (Aromatic).

Terebene,	320 minims
Acacia, in powder,	$\frac{1}{2}$ ounce av.
Flavored Syrup, sufficient to make	1 pint

Put the terebene in a pint bottle and add the powdered acacia; shake them well together and add the flavored syrup, agitating them until well mixed. Shake when dispensing, and put a "shake label" on the bottle.

This syrup contains $2\frac{1}{2}$ minims of terebene in a fl.drachm. To make a syrup of terebene with 5 minims of terebene to the fl.drachm take 640 minims of terebene with acacia 1 ounce and flavored syrup sufficient to make 1 pint, and proceed in the same manner as above.

Syrup of Terpin Hydrate with Codeine.

Terpin Hydrate,	128 grains
Codeine Sulphate,	16 grains
Flavored Syrup, sufficient to make	1 pint

Rub the terpin hydrate in a mortar with the codeine sulphate, and then with the syrup in separate portions. Shake before dispensing, and put a "shake label" on the bottle.

A variety of compounds may be made with terpin hydrate by adding various cough syrups as may be found among the Standard Remedies (which see), in place of the flavored syrup, as directed above.

SYRUPS OF VEGETABLE SUBSTANCES.

The following are a few of the more commonly used unofficial syrups prepared chiefly from vegetable drugs:

Syrup Adiantum or Maiden-Hair Fern.

Maiden-Hair Fern,	1 ounce av.
Boiling Water,	10 fl.ounces
Sugar,	17 ounces av.

Pour the boiling water on the drug and infuse for half an hour, then strain, and dissolve the sugar in 9 fl.ounces of the liquid.

This is used for coughs etc., the dose being from a teaspoonful to a tablespoonful. It is also known as Syrup Capillaire. It may be flavored with orange flower or other aromatic water.

The following syrups are prepared in a similar manner:

Syrup Carrageen or Iceland Moss.—Soak first in water, and pour off to deprive of bitterness. Then make as above.

Syrup Corsican Moss, or Helminthocortus. Make as above.

Syrup Licorice Root, or Glycyrrhiza, and of other similar substances which make demulcent syrups are prepared in the same manner.

Syrup Aralia Compound. Alterative Syrup.

This may be made by mixing

Fluidextract Spikenard Compound,	4 fl.ounces
Syrup,	12 fl.ounces

or by making an extract of the ingredients as directed for making fluidextract of spikenard compound, distilling off the alcohol and making 4 pints of syrup with sugar and water. This is the Eclectic Syrup Aralia or Spikenard Compound, much esteemed as an alterative. The dose is from a teaspoonful to a tablespoonful.

Syrup Artemisia Compound. Syrup of Mugwort Compound.

Fresh tops of mugwort, pennyroyal, catnip and savine, each, 2 ounces av.; fresh roots of elecampane, lovage and fennel, each, 88 grains; fresh tops of marjoram, hyssop, rue, feverfew and basil, of each 1 ounce av.; aniseed $\frac{1}{4}$ ounce, cinnamon $\frac{1}{4}$ ounce, rectified spirit 3 ounces, water 30 ounces, syrup of honey $12\frac{1}{2}$ ounces av. Infuse the plants with the water and spirit, and after standing 24 hours distil over 4 fl.ounces, press the residue, clarify the liquid with white of egg, add sugar 25 ounces av.; make into a syrup, add the syrup of honey, and lastly add the distilled liquid and strain. The dose is 2 to 8 drachms as an aromatic tonic and bitters.

Syrup Asarum Compound.

Macerate $1\frac{1}{2}$ ounces av. of asarum (Canada snakeroot or wild ginger) with 10 fl.ounces of diluted alcohol. Pour off the liquid and reserve. Then add 4 fl.ounces of water, macerate and express, adding the liquid to the portion reserved. To this add 40 grains cochineal in powder, 75 grains potassium carbonate, wine of ipecac 1 fl.ounce, and 28 ounces of sugar; dissolve and strain. This is used in cough mixtures and as a fine aromatic. Dose, a teaspoonful or more.

Syrup Blackberry Aromatic.

This syrup may be made by mixing fluidextract of blackberry (aromatic) 2 fl.ounces, syrup 14 fl.ounces; or by making an aromatic fluidextract of blackberry, 16 fl.ounces; distilling off the alcohol, and making 1 gallon of syrup with sugar and water. It may also be made by adding 2 fl.ounces of fluidextract of blackberry and $\frac{1}{4}$ ounce fluidextract of aromatics to 14 ounces of syrup.

Syrup Carrageen Compound. Compound Syrup of Iceland Moss.

Pour cold water on $\frac{1}{2}$ ounce of Iceland moss and let stand 12 hours, then pour off and throw away. Boil hoarhound $\frac{1}{2}$ ounce, liverwort $\frac{1}{2}$ ounce and the softened carrageen with 1 pint of water for 20 minutes or more, then strain 12 fl.ounces and dissolve in the liquid 24 ounces av. of sugar. This is an excellent demulcent cough syrup. Dose, a teaspoonful or more.

Syrup Ceanothus Compound. Compound Syrup of Red Root.

Tops and leaves of red root, or Ceanothus, wild lettuce, each, 1 ounce av.; cimicifuga $\frac{1}{2}$ ounce, pleurisy root, wild ginger root, each, $\frac{1}{4}$ ounce; lobelia, bloodroot, each, 1 drachm. Make an extract with diluted alcohol, distil off the alcohol and make 2 pints of syrup with the residue, sugar and water. This is used as a cough remedy. The dose is a teaspoonful or more.

Syrup Corydalis Compound. Compound Syrup of Turkey Corn.

Turkey Corn Tubers,	10 ounces av.
Twin Leaf, (<i>Jeffersonia Diphylla</i>),	5 ounces av.
Blue Flag,	$2\frac{1}{2}$ ounces av.
Sheep Laurel Leaves,	$2\frac{1}{2}$ ounces av.
Sugar,	6 pounds
Alcohol, Water, each, sufficient.	

Reduce the drugs to a coarse powder and cover them with alcohol. Macerate for 24 hours then put in the water-bath percolator. Draw off the alcoholic tincture and reserve. Continue the percolation with water until exhausted. Evaporate the last portion of the percolate to a thin extract, add the reserved portion and enough water to make the measure 5 pints, after standing, filter, and dissolve the sugar in the filtrate by percolation or very gentle heat.

This syrup is much esteemed by the Eclectics as an alterative and diuretic for scrofula, syphilis etc. Dose, a teaspoonful or more.

Syrup Licorice Compound. Compound Syrup of Glycyrrhiza.

Licorice Root, in coarse powder,	2 pounds
Marshmallow Root, cut,	8 ounces av.
Sugar,	6 pounds
Alcohol, Water, each, sufficient.	

Macerate the drugs with warm water enough to cover them well, pouring off the liquid after standing a few hours, and repeating the operation until 1 gallon is obtained; evaporate to 4 pints, strain, add 1 pint of alcohol, and dissolve the sugar in the liquid by percolation or gentle heat.

This is an excellent demulcent syrup for coughs etc., and a vehicle for quinine without any objectionable qualities.

Syrup Marrubium Compound. Compound Syrup of Hoarhound.

This may be made by mixing 3 fl.ounces of fluidextract of hoarhound compound with 6 fl.ounces of water, filtering and dissolving in the filtrate 14 ounces of sugar, or by making an extract from the drugs directed for making the fluidextract, and making it, by the addition of sugar and water, $5\frac{1}{2}$ pints of syrup.

This is an excellent tonic cough syrup for pulmonary affections. The dose is a teaspoonful.

Syrup Mitchella Compound.**Compound Syrup of Partridgeberry or Squaw Vine.**

This may be made by mixing $3\frac{1}{2}$ fl.ounces of fluidextract of mitchella compound with 6 fl.ounces of water, filtering and dissolving in the filtrate 14 ounces av. of sugar, or by making an extract of the drugs as directed in the formula for fluidextract and to the quantity stated adding water and sugar to make 5 pints of the syrup.

This syrup is an Eclectic preparation much esteemed as a parturient and uterine tonic. Dose, a teaspoonful to a tablespoonful.

Syrup Opium and Ipecac. Dover's Syrup.

This may be prepared in several ways, all amounting to the same. The following are the most expedient:

Fluidextract of Ipecac,	128 minims
Aqueous Extract of Opium,	75 grains
Syrup,	1 pint

Rub the extract of opium with the fluid extract and a portion of the syrup until dissolved, then add the remainder of the syrup; or by mixing

Deodorized Tincture of Opium,	$2\frac{3}{4}$ fl.ounces
Fluidextract of Ipecac,	128 minims
Syrup, sufficient to make	1 pint

This syrup contains the equivalent of 10 grains of Dover's Powder in a teaspoonful or fl.drachm, the usual dose.

Syrup Phytolacca Compound. Compound Syrup of Poke.

This may be made by mixing 3 fl.ounces of fluidextract of poke compound with 6 fl.ounces of water, filtering and dissolving 14 ounces av. of sugar in the filtrate, or by making an extract of the drugs as directed, and with water and sugar, making $5\frac{1}{2}$ pints of the syrup. The dose is a teaspoonful or more.

Syrup Rhubarb and Potassium. "Neutralizing Syrup."

Rhubarb, in very coarse powder,	5 ounces av.
Potassium Bicarbonate,	5 ounces av.
Golden Seal, in coarse powder,	2 ounces av.

Cinnamon, in fine powder,	2	ounces av.
Oil of Peppermint,	30	minims
Alcohol,	1½	pints
Sugar,	6	pounds
Water, a sufficient quantity.		

Pack the drugs loosely in the water-bath percolator and having mixed the alcohol with a pint and a half of water, pour enough of the liquid on them to saturate and cover them. Let stand for 24 hours and having dissolved the potassium bicarbonate in the remainder of the liquid pour it upon the drugs; heat very moderately, and after an hour begin to percolate, reserving all that will pass. Remove the heat and continue the percolation with water until the drugs are exhausted. Evaporate this latter portion to 2 ½ pints. Dissolve the oil of peppermint in the portion first reserved, add the evaporated portion and enough warm water to make 5 pints, filter and dissolve the sugar in the filtrate.

Syrup Rumex Compound. Compound Syrup of Yellow Dock.

This may be made by mixing 5 fl.ounces of fluidextract rumex compound with 5 fl.ounces of water, filtering and dissolving in the filtrate 14 ounces of sugar.

Or, by making an extract as directed, and with water and sugar, making 4 pints of syrup.

This is an Eclectic syrup much esteemed as a blood-purifier, alterative etc. The dose is a teaspoonful to a tablespoonful. Iodide of potassium may be added, 1 or 2 drachms to a pint.

Syrup Stillingia Compound. Compound Syrup of Queen's Root.

This may be prepared by mixing 4 fl.ounces of fluidextract of stillingia compound with 5 fl.ounces of water, filtering and dissolving in the filtrate 14 ounces av. of sugar, or by making an extract from the drugs as directed and with water and sugar making 4 pint of syrup.

This is a valuable alterative syrup and blood purifier, first introduced by the Eclectics. It is much more effective than syrup sarsaparilla compound, and is given in scrofula, syphilis etc. The dose is a teaspoonful to a tablespoonful. Iodide of potassium may be added if desired.

Syrup Yerba Santa Compound or Aromatic.

Yerba Santa, coarsely ground,	4	ounces av.
Orange Peel, in coarse powder,	½	ounce av.
Cinnamon, in powder,	60	grains
Cloves, in powder,	60	grains
Magnesia, calcined,	¾	ounce av.
Sugar,	28	ounces av.
Alcohol,		
Water, of each, sufficient to make	2	pints

Mix 1 part of alcohol by measure with 7 parts of water. Mix the drugs with the magnesia, moisten with sufficient of the mixed water and alcohol and pack in the water-bath percolator; cover with the menstruum and allow to stand 24 hours. Then heat very moderately and begin to percolate, adding the menstruum and continuing the percolation until a pint is obtained, filter this, adding a little more magnesia to the filter if necessary to make clear, and dissolve the sugar in the filtrate by gentle heat or by percolation.

This syrup is one of the best known vehicles for quinine, as it almost entirely masks its bitterness. It may also be used for bronchial affection.

TABELLÆ — TABLETS.

This title is applied rather loosely to a variety of preparations, either cut, moulded or pressed into desired shape and size. In the U. S. P. no tablets are official, and in the Br. P. only one. Manufacturers furnish a very complete assortment of tablets made for different uses, and they have come to be an important part of the physician's armament because of the accurate dosage which they represent and the convenience of administration.

Tablets differ from troches or lozenges in being made of dry powders by compression, while the latter are made up in the form of a mass before dividing.

Compressed Tablets.

As known to American pharmacy compressed tablets are flattened or convex discs made by compressing some medicinal substance or compound in a dry state with, or without sugar, or some other diluent. They may be compressed by small hand tablet or pill compressors, or by power machines which are made for this purpose, but as to the latter they are only used by large manufacturers. The tablets are usually from 1 to 5 grains, or may be larger. They are variously called by manufacturers compressed pills, powders or tablets, and are made of different degrees of solidity for various purposes. Such as are intended to be dissolved slowly in the mouth are made quite hard in order to prolong the local action of the medicament; those intended for internal administration and for solutions are compressed just enough to permit handling without breaking, while those intended for hypodermic use are quite friable, so that they may dissolve very quickly.

Coated Tablets. For internal administration tablets may be coated with chocolate or some compound of sugar in order to cover the taste of the medicament, and also to preserve them from the action of the atmosphere and from breaking. As thus prepared they have, to a large extent, taken the place of pills, and, being friable, they are more readily disintegrated and absorbed.

Tablet Triturates. All compound tablets in which the weight of the medicinal substance is less than 1 grain are made by triturating the substance with sugar of milk or some other diluent before compressing. Enough sugar of milk or other diluent is added to make the weight of the finished tablet 1 grain.

Effervescent Tablets. These are made of dry substances mixed and compressed in the form of tablets, which, when thrown into a glass of water will be decomposed with evolution of carbonic acid gas.

Hypodermic Tablets are prepared only from active remedies by trituration with some very soluble diluent, and by compressing with very little force so that they may readily disintegrate when used.

Fruit Tablets or Lozenges.

These are supplied by the confectioners in great variety and of various shapes and sizes, being generally moulded convex, oval, or nearly round, or cut in squares. To make first class fruit tablets the fruit juices must be added to melted rock candy and the mixture boiled until it is of proper temper. It is then run into or through properly constructed moulds, such as are used by confectioners, or run into pans and cut into square tablets. They should then be dusted, by rolling with powdered rock candy or starch to prevent sticking together.

When made with ordinary sugar, tablets soon become soft and discolored. It is therefore necessary to use rock candy as the basis of the tablets, fruit juices being added sufficient to flavor and color them. Flavoring extracts also may be added just before running in the moulds. Many other tablets besides those made with fruit juices are made in a similar manner; cough tablets particularly, having a large sale. They usually contain some opiate in small quantities and are strongly flavored with oil of anise or paregoric, and colored black, brown or red, with elderberry juice, caramel or cochineal coloring.

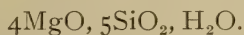
For other tablets, troches or lozenges, see Troches.

TABELLÆ TRINITRINI. Br. Trinitrin Tablets.

Tablets of Nitroglycerin.

"Tablets of chocolate, each weighing 5 grains (0.324 Gm.), and containing $\frac{1}{100}$ of a grain (0.00065 Gm.) of the trinitroglycerin of commerce." < Br. Dose, 1 to 2 tablets.

TALCUM. U. S. Talc. French Chalk.



"A native hydrous magnesium silicate." < U. S.

This substance has come into prominence recently because of its extensive use as a dusting and toilet powder. The above formula represents the true French chalk, but the ordinary soapstone or steatite which also contains the aluminum oxide is more commonly used, es-

pecially in the powdered form. Talc in flat pieces is used by tailors for marking cloth; in powder either talc or ordinary soapstone is furnished for dusting into shoes, or put up as foot-ease, and is perfumed and used as a baby and toilet powder for chafe etc. Talcum powder has come into extensive use, either plain, medicated or perfumed, as Toilet Powder.

TALCUM PURIFICATUM. U. S. Purified Talc.

Talc, in fine powder,	500 Gm. or 29 ounces av.
Hydrochloric Acid,	75 Cc. or 3 fl.ounces
Water, a sufficient quantity.	

The talc is to be mixed with about 2500 Cc. (or 100 fl.ounces) of boiling water, 50 Cc. (or 2 fl.ounces) of hydrochloric acid gradually added, and the mixture boiled for 15 minutes. The supernatant liquid containing the finer particles of talc in suspension is to be decanted and rejected. The residue is to be boiled again with 2500 Cc. (or 100 fl.ounces) of water mixed with the remainder of the hydrochloric acid and allowed to stand for 15 minutes. The liquid portion containing the finer particles of talc in suspension is again to be decanted and rejected and the coarser residue repeatedly washed with water, until a portion of the wash-water after acidifying with nitric acid, fails to become opalescent upon the addition of silver nitrate test solution. The magma is then to be transferred to a close muslin or linen strainer, allowed to drain, and dried at 110°C. (230°F.).

This is directed in the U. S. P. to be used as a filtering medium in making several of the medicated waters and in some elixirs, syrups and tinctures.

TAMARINDUS. U. S., Br. Tamarind.

"The preserved pulp of the fruit of *Tamarindus indica*." <U. S.

"The fruits of *Tamarindus indica*, freed from the brittle outer part of the pericarp and preserved with sugar." <Br.

This mildly acid laxative pulp is used in making confection of senna, and may be employed in making laxative confections.

TANNIN COMPOUNDS.

Tannic acid combines with many mineral and organic substances forming compounds useful as medicinal agents. Most of the compounds with inorganic elements are noted under the element with which tannin combines, in the Chemical Section, Part I. A few of the more important compounds of tannin with organic substances are noted here.

Tannal. Basic Aluminum Tannate. A brownish-yellow, insoluble powder, used as an astringent for catarrh and catarrhal affections. It may be used with other inert ingredients as a snuff.

Tannalbin. Tannin Albuminate, Exsiccated. Prepared by precipitating a solution of tannin with albumen, and drying the precipitate. It is used as an intestinal astringent, not being dissolved in the mouth and stomach, but being decomposed in the intestines, liberating the tannin from its combination. Dose 15 to 30 grains in mucilage or gruel; children 5 to 15 grains.

Tannigen. Diacetyl-tannin. An insoluble whitish powder, employed as an intestinal astringent; it is not dissolved in the stomach, but the tannin is liberated from its combination in the intestines. Dose 5 to 30 grains.

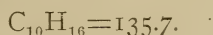
Tannipine. Hexamethylenetramine-Tannin. A complex astringent and disinfectant compound. Dose internally 10 to 15 grains.

Tannismuth. The trade name for bismuth ditannate. It is a light-yellow powder having a slight astringent taste, insoluble in water. It contains from 17 to 21 percent. of bismuth and is used as an intestinal astringent. Dose 5 to 15 grains.

Tannocol. A compound of tannin with gelatin. It is a grayish-white powder containing about 50 percent. of tannic acid. It is almost insoluble in alkaline solutions, therefore it is a valuable intestinal astringent, being insoluble in the stomach, but decomposed by the pancreatic secretion. Dose 15 to 30 grains.

Tannoform. Tannin Formaldehyde. A reddish powder prepared by the interaction of tannin and formaldehyde. It is insoluble in water, but soluble in alkaline solutions. This is used as an antiseptic astringent application, usually combined with half or three-fourth inert substance, as a dusting powder. Dose internally 4 to 15 grains.

TEREBENUM. U. S., Br. Terebene.



"A liquid consisting of dipentene and other hydrocarbons, obtained by the action of concentrated sulphuric acid on oil of turpentine and subsequent rectification with steam." <U. S.

"A mixture of dipentene and other hydrocarbons, obtained by agitating oil of turpentine with successive quantities of sulphuric acid until it no longer rotates the plane of a ray of polarized light, and then distilled in a current of steam." <Br.

A colorless, or slightly-yellowish thin liquid, having an agreeable thyme-like odor and an aromatic, somewhat terebinthinate taste. Its sp. gr. is about 0.850 at 25°C. (77°F°). It boils at 155° to 165°C. (311° to 329°F°). Soluble in three times its volume of alcohol.

Uses. Terebene is given as an expectorant for coughs and bronchitis, 4 to 8 drops or more on sugar; and in the form of emulsions or in tablets, and is also used in the form of hot vapor. Externally it is applied as a dressing for sores, in a 5% aqueous solution, or a 5 to 10 percent. ointment. Average dose.—0.5 Cc. (8 minims).

TEREBINTHINÆ. U. S. Turpentine.**Thus Americanum. Br. Frankincense.**

"A concrete oleo-resin obtained from *Pinus palustris*, Miller; and from other species of *Pinus*." <U. S.

"The concrete oleo-resin which is scraped off the trunks of *Pinus palustris*, Mill., and *Pinus Tæda*, Linn." <Br.

When fresh it is rather soft, and is commonly known as **pine pitch**, when older is a yellowish, opaque substance, commonly known as gum turpentine or gum thus. From the soft fresh pitch which is collected by "boxing" the trees, the oil of turpentine, or "spirits of turpentine" of commerce is distilled, leaving the residue, resin, or "rosin" of commerce.

Uses. This is used as an ingredient in ointments, plasters, balsams etc., and may be made into a syrup like tolu in the same manner.

TEREBINTHINA CANADENSIS. U. S., Br.**Canada Turpentine. Canada Balsam. Balsam of Fir.**

"A liquid oleo-resin obtained from *Abies balsamea*, Linné, Miller (Fam. Coniferæ)." <U. S.

"The oleo-resin obtained from *Abies balsamea*, Mill." <Br.

A pale yellow or faintly greenish, transparent oleo-resin of the consistence of thin honey, becoming thicker when exposed.

Uses. This balsam is used extensively in making printing ink and some transparent varnishes, also on microscopic slides and some kinds of spectacle glasses. In pharmacy it is employed in making some liquid balsams, and in some liniments.

TERPINI HYDRAS. U. S. Terpin Hydrate.

"The hydrate [$C_{10}H_{18}(OH)_2 + H_2O$] of the diatomic alcohol terpin. Terpin hydrate should be kept in well-stoppered bottles." <U. S.

Preparation. The French Codex, under the title **Terpine**, gives the formula which may be translated as follows:

Nitric Acid of Commerce,	39 Gm.
Water,	11 Gm.
Alcohol, (85%),	50 Gm.
Oil of Turpentine, rectified,	200 Gm.
Liquid Caustic Soda, (density 1.332), q. s.	

In a glass or porcelain basin, mix the acid and water, allow to cool and add the alcohol, then the oil of turpentine; cover with a filtering paper and set aside in a cold place, stirring occasionally. After several days crystals of terpin will commence to deposit. When they no longer deposit, pour off the liquid into a filter and collect the crystals that have formed and wash them with a small quantity

of water in which a little sodium carbonate has been dissolved. Replace the filtered liquid in the basin, neutralize it with the soda liquid, and leave the liquid to deposit new crystals of terpin. Separate the second lot of crystals as the first and mix them. Dissolve the crystals obtained in the least possible quantity of boiling water, and neutralize them with sodium bicarbonate, filter hot through muslin, cool rapidly and agitate continually in a flask to produce crystals; pour the mixture into a funnel stopped with a plug of cotton that the crystals may drain, and wash them with a very little cold water. If the crystals are colored, dissolve them again in a little boiling water, the smallest quantity possible, and recrystallize and separate the crystals, drying them in the air between two sheets of blotting paper, and preserve them in a wide-mouth bottle.

This is in colorless, lustrous, rhombic prisms; nearly odorless, and has a slightly aromatic and somewhat bitter taste.

It is soluble in 200 parts of water and in 10 parts of alcohol at 25°C. (77°F.). It melts at 116° to 117°C. (240° to 242.6°F.), with loss of water, and at a temperature of boiling water sublimes in fine needles.

Uses. It is used as expectorant in doses of 2 to 3 grains, and in renal affections as a stimulant to the mucous membrane, in doses of 3 to 4 grains. It is also prescribed for whooping cough. It may conveniently be given in the form of pills or tablets. It is also made into elixirs, either simple or compounded with other medicines.

Average dose.—0.125 Gm.=125 milligrammes (2 grains).

TETRAIODOPHENOL-PHTALEIN. Iodophen. Nosophen.

This complex preparation is a light-yellow, odorless, tasteless powder containing 60 percent. of iodine, and is used chiefly for the same purposes as iodoform, externally and internally, as an intestinal antiseptic. Dose 5 to 10 grains.

Nosophen-bismuth is known as Eudoxin.

Nosophen-mercury is known as Apallagin.

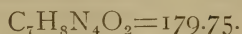
Nosophen Sodium is known as Antinosin.

THALLINUM. Thallin. Thalline.

This as an alkaloid or principle of an alkaloidal nature obtained from Peruvian bark or produced synthetically by a complicated process, official in several European countries. It and its salts are powerful antipyretics and germicides and are used internally in doses of 4 to 8 grains and in solution for urethral injections for chronic gonorrhœa etc.

Thalline Sulphate. This is prepared by neutralizing diluted sulphuric acid with thalline, concentrating and crystallizing.

Thalline Tartrate. A solution of tartaric acid is neutralized with thalline and allowed to crystallize.

THEOBROMINUM. Theobromine.

This alkaloid is obtained from cacao, and is identical with caffeine and theine, which see. It is also prepared synthetically from xanthine, the synthetic product being known as dimethylxanthine. Theobromine is used for the same purposes as caffeine and as a diuretic in cardiac dropsy. It forms salts with acids and compounds which are somewhat used in medicine. Dose, 5 to 15 grains.

Theobromine and Lithium Benzoate. This is known in the market as **Uropherin B.** A white powder containing 50 percent. of theobromine. Used as a diuretic. Dose 5 to 15 grains.

Theobromine and Lithium Salicylate. This is known in the market as **Uropherin S.** and is used for the same purposes as lithium benzoate.

Theobromine and Sodium Salicylate. Diuretin. A compound of sodium salicylate and theobromine containing 38 percent. salicylic acid and 50 percent. theobromine. A prompt diuretic. Dose, $7\frac{3}{4}$ to 15 grains.

Theobromine Salicylate. This may be prepared by adding theobromine to a hot, concentrated solution of salicylic acid and allowing to crystallize. It is employed as a diuretic and urinary antiseptic. Dose, 10 to 15 grains.

Theobromine-Sodium. This combines with several other sodium salts making preparations that are marketed under trade names as **Agurin, Anistheobromine, Thephorin, Enstenin, Theolactin.**

THERIACA. Treacle.

This was official in the 1885 Br. P., but was dismissed from the 1898 revision. It is frequently mentioned in older formulas.

The uncrystallized residue of the refining of sugar, or what is known in this country as "Golden Syrup." In ancient pharmacy a variety of confections or electuaries were known by this name and employed as antidotes for infections or poisons. They were composed of a great number of ingredients, the *Theriaca Andromachi* of the Ph. L., 1760, containing over 60 substances, with 1 grain of opium in 75. The *Electuaire Thériaque* or *Theriaca* of the Paris codex contains 72 ingredients, with 1 grain of opium in 72 grains. *Confectio Damocratus, Mithridate, Philonium Romanum, the Opiate of Solomon* (see Confections), and some others are compounds of a great number of aromatics similar to the *Thérique* of the Paris Codex, but are now unused, ordinary molasses, syrup, or honey being used when *Theriaca* or *Treacle* is directed.

THIOLCOL. Guaiacol Sulphonate of Potassium.

A white odorless powder, soluble in water but only slightly soluble in alcohol, insoluble in ether or oils. It is employed for the same purposes as guaiacol in tuberculosis and fevers. Dose 5 to 20 grains.

THIOLUM. Thiol. Tiol.

Official in the Mex. and Germ. S.

This may be prepared by heating peat-tar or paraffin oils of sp. gr. 0.89 to 0.90 with sulphur, to a temperature of 215°C ., which causes the unsaturated hydrocarbons (olefins etc.), to combine with the sulphur. These are then separated by suitable solvents and treated with concentrated sulphuric acid at low temperature, and the thiol separated by the addition of ice, by which it is congealed. This is then separated in vacuo to a proper consistence for liquid thiol, or to dry thiol.

Preparation. The Mexican official formula is:

Oil of Tar,	100 parts
Sulphuric Acid,	40 parts
Sulphur, (flowers),	10 parts

Ammonia Water, a sufficient quantity.

Heat the oil to 215°C .; add the sulphur in portions, waiting after each portion is added for the vapor of hydrogen sulphide to escape; add the acid to the sulphurous product, cover it with water and knead it to remove excess of acid and oil; pour off and dissolve the mass which remains in water. Neutralize the solution with ammonia water, agitate it with petroleum ether, separate this solution and pour it into a solution of salt; agitate and after standing separate the thiol which forms from the mixture, and purify it by dialysis.

Liquid Thiol is a thin, brownish-black liquid, having a slight odor of birch oil. It mixes with water and is used as an antiseptic application for skin diseases.

Dry Thiol is given internally in pill, $1\frac{1}{2}$ grain. It is also used externally as a dusting powder mixed with inert powder or a bismuth salt, or an ointment, 10%, with petrolatum.

Many combinations of thiol with other substances are used, as:

Thiol Solution. Equal parts thiol and distilled water.

Thiol Glycerite. Liquid thiol 2 parts, glycerin 1 part.

Thiol Dusting Powder. Dry thiol 1 part, wheat starch 4 parts, French chalk 1 part.

Thiol Salve. Liquid thiol 1 part, prepared lard 9 parts.

Thiol Collodion. Dry thiol 1 part, collodion 19 parts.

Thiol Wine. Dry thiol 1 part, wine 99 parts.

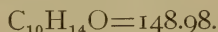
THIOSINAMINE.

This is, chemically, allyl sulphocarbamide. It is also known by the trade name, Rhodalin. It is a yellowish, crystalline powder, soluble in alcohol and water; used as an antiseptic application for lupus etc., and as a resolvent causes absorption of glandular swellings. Dose internally $\frac{1}{2}$ to 2 grains; subcutaneously in 20% solution with alcohol and glycerin 10 to 20 minims.

Thiodine is a compound of thiosinamine ethylate with iodine.

Fibrolusin is thiosinamine and sodium salicylate.

THYMOL. U. S., Br. Thymol.



"A phenol [$\text{C}_6\text{H}_3(\text{CH}_3)(\text{OH})(\text{C}_3\text{H}_7)_{1:3:4}$] occurring in the volatile oil *Thymus vulgaris*, Linné; and in some other volatile oils. It should be kept in well-stoppered bottles." <U. S.

"A crystalline substance, $\text{C}_6\text{H}_5\cdot\text{OH}\cdot\text{CH}\cdot\text{C}_8\text{H}_7$, obtained from the volatile oils of *Thymus vulgaris*, Linn., etc." <Br.

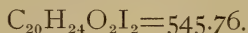
Its sp. gr. as a solid is 1.030 at 25°C. (77°F.), but when melted it is lighter than water. It melts at 50°C. (122°F.), remaining fluid at a considerably lower temperature. It is soluble in 1100 parts of water at 25°C. (77°F.) and in less than its own weight of alcohol, ether or chloroform. It is also soluble in glacial acetic acid and oils. When triturated with camphor or with chloral it liquifies.

Uses. It is employed in surgery as an antiseptic, and is much used in dental surgery, in solution, 1 to 1000, and may be made stronger by the use of a little alcohol. It is also used as a lotion for sores, ulcers etc., and for preserving anatomical specimens. It is combined with lanolin or petrolatum in the form of ointment, and may be used as an ointment and internally in powder. Dose, $2\frac{1}{2}$ grains.

Thymol Salicylate. Salithymol. A white, crystalline powder, prepared by the interaction of thymol and salicylic acid. It is almost insoluble in water, but soluble in alcohol. It is given as an internal antiseptic; dose, 5 to 10 grains; and employed, in the form of ointment, as an antiseptic dressing.

Thymacetin. A white, crystalline powder, given as a hypnotic in dose of 5 to 45 grains.

THYMOLIS IODIDUM. U. S. Thymol Iodide.



"Dithymol-diiodide [$(\text{C}_6\text{H}_2\cdot\text{CH}_3\cdot\text{C}_3\text{H}_7\text{OI})_2$] obtained by the condensation of two molecules of thymol and the introduction of two atoms of iodine into the phenolic groups of the thymol; it contains 45 percent. of iodine. Thymol iodide should be kept in amber-colored vials protected from light." <U. S. (Commonly known as "Aristol").

THYROIDEUM SICCUUM. Br. Dry Thyroid.

Glandulæ Thyroideæ Siccae. U. S. Dessicated Thyroid Glands.

"A powder prepared from the fresh and healthy thyroid gland of the sheep. Remove the external fat and connective tissue from thyroid glands taken from the sheep immediately after killing. Cut the glands across, and reject any which contain cysts, are hypertrophied, or otherwise abnormal. Mince finely the healthy glands,

and dry at a temperature of 90° to 100°F. (32.2° to 37.8°C.); powder the dried product, remove all fat from it by treatment with petroleum spirit (gasoline) and again dry the residue." <Br.

Dose, 3 to 10 grains.

A solution is also official in the Br. P. (See *Liquor Thyroidei*).

TINCTURÆ — TINCTURES.

Tinctures are solutions of medicinal substances or their soluble constituents, in alcoholic or hydro-alcoholic menstrua; differing from spirits chiefly in being prepared from non-volatile substances.

They are the most used of any class of official preparations, and it is highly important that they should be well made, of the best materials, and up to the highest standard of strength.

The Process of Percolation. In the Appendix to the Br. P., 1898, under the heading "Tinctures," the process of percolation intended to be used for tinctures is explained. It is the same as the U. S. process, except that the drug is to be pressed after percolation and the liquid obtained by pressure to be added to the percolate; then filtered.

The Process of Maceration. In the Appendix to the Br. P., 1898, under the heading "Tinctures," the process of maceration is as follows: "Place the solid materials in the whole of the menstruum for seven days, frequently agitating. Strain. Press the marc. Mix the expressed liquid with the strained liquid. Filter if necessary."

These two processes are what are referred to in the Br. P. formulas when it is directed to "complete the percolation process" or "prepare by the maceration process."

Of all processes, however, which have been proposed for making tinctures, none will be found so valuable and economical as the process of water-bath percolation, which, by the influence of heat, dissolves and removes with the percolate all the medicinal value of the drug. The formulæ that are given for making tinctures by water-bath percolation mostly conform to the standard of strength of the U. S. Pharmacopœia.

The tinctures of American pharmacy are now mostly made to represent 5, 10, 15, or 20 percent. of the medicinal substance, there being but few variations to this general rule. Those of British pharmacy mostly represent 5, 10, 12½ and 20 percent., while those of German and French pharmacy are all in decimal proportion.

TINCTURA ABSINTHII. P. G. Tincture of Wormwood.

Wormwood, in No. 40 powder,	1 part
Diluted Alcohol,	5 parts

Make a tincture by percolation or maceration.

This may also be prepared by mixing 1 ounce of fluidextract of wormwood with 5 ounces of diluted alcohol.

TINCTURA ABSINTHII COMPOSITA. Fr.

Wormwood tops 25 Gm., germander 25 Gm., gentian root 25 Gm., bitter orange peel 25 Gm., rhubarb 25 Gm., aloes 5 Gm., cascarilla 5 Gm., alcohol (60%), 1000 Gm. Reduce the substances to a coarse powder and macerate with the alcohol during 10 days, in a covered vessel, with occasional stirring. Then pour off the liquid, express the residue and add and filter.

This or a similar preparation is more familiarly known as "Stoughton Bitters." The Swiss formula is: Wormwood 8 parts, centaury herb 4 parts, galangal, calamus, bitter orange peel, each, 2 parts, cinnamon, cloves, each, 1 part, diluted alcohol 100 parts.

TINCTURA ACONITI. U. S., Br. Tincture of Aconite.

The U. S. P. formula now is:

Aconite, in No. 60 powder, (containing not less than 0.5 percent. of aconitine), 100 Gm. or $3\frac{1}{2}$ ounces
Alcohol,

Water, each, a sufficient quantity

To make 1000 Cc. or 34 fl.ounces

Mix 7 measures of alcohol with 3 measures of water as a menstruum. Moisten the powder with 40 Cc. (or $1\frac{3}{8}$ fl.ounces) of the menstruum, transfer it to a percolator and, without pressing the powder, allow it to stand, well covered, for 6 hours; then pack it very firmly and pour on enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator macerate for 48 hours. Then allow the percolation to proceed slowly, gradually adding menstruum until 1000 Cc. (or 34 fl.ounces) are obtained."

"Tincture of aconite, when assayed by the process given, should contain in 100 Cc. 0.045 Gm. of aconitine." < U. S. This makes a 10 percent. tincture.

As assayed Fluidextract of Aconite may be had from reliable manufacturers it may be as well to make the tincture as follows:

Fluidextract of Aconite, 100 Cc. or $3\frac{1}{2}$ fl.ounces

Menstruum, (Alcohol 7 vol., Water 3 vol.),

Enough to make 1000 Cc. or 35 fl.ounces

Mix them thoroughly.

Average dose.—0.6 Cc. (10 minims).

The important change in the strength of this tincture from 35 percent. in the Seventh revision to 10 percent. in the present revision should be well understood, and in filling or refilling prescriptions containing it the druggist should be very careful to know what strength of tincture of aconite is required.

The U. S. tincture of aconite is given as an arterial sedative in average doses of 10 minims.

The Br. P. formula is:

Aconite Root, No. 40 powder, 1 ounce or 50 Gm.

Alcohol, (70%), a sufficient quantity.

Make by the percolation process. The resulting tincture should measure 20 fl.ounces (or 1000 Cc.), making a 5% tincture. Dose, 5 to 15 minims. This is one-half the strength of the U. S. P. tincture.

Fleming's Tincture of Aconite. This is a very strong tincture of aconite prepared by macerating aconite root, in fine powder, 16 ounces av., with 1 pint of alcohol, for five days, then transferring to a percolator and adding alcohol, percolating slowly until 24 fl.ounces are obtained.

Ethereal Tincture of Aconite, (Paris Codex), is made by macerating or percolating 4 parts of aconite root with 16 parts (by weight) of ether. It is used externally.

Tincture of Aconite Leaves.

This was formerly official in the U. S. P., being prepared with aconite leaves 1 part, macerated with 8 parts of diluted alcohol. It is now official in several pharmacopœias.

TINCTURA ADONIS VERNALIS.

Adonis Vernalis, (the herb), in coarse powder, 2 ounces

Diluted Alcohol, sufficient to make 16 fl.ounces

Macerate the powder for 24 hours with a portion of the diluted alcohol sufficient to cover it, then percolate with diluted alcohol until 16 fl.ounces have passed.

This is highly extolled as a heart stimulant, similar to digitalis, but having no cumulative action. The dose of the tincture is 10 to 15 minims.

TINCTURA ALOES. U. S., Br. Tincture of Aloes.

The U. S. formula is:

Purified Aloes, No. 40 powder, 100 Gm. or 3½ ounces av.

Glycyrrhiza, No. 40 powder, 200 Gm. or 7 ounces av.

Diluted Alcohol, to make 1000 Cc. or 34 fl.ounces

"Macerate the powders in a stoppered container, in a moderately warm place, with 750 Cc. (or 25½ fl.ounces) of diluted alcohol, for seven days, with occasional agitation; then filter through purified cotton, or a plain paper filter and, when the liquid has drained off completely, pass enough diluted alcohol through the residue to make 1000 Cc. (or 34 fl.ounces) of tincture." <U. S.

Average dose.—2 Cc. (30 minims).

The Br. P. formula is:

Extract of Barbados Aloes, 25 Gm. or ½ ounce

Liquid Extract of Liquorice, 150 Cc. or 3 fl.ounces

Alcohol, (45%), a sufficient quantity.

"Place the Barbados aloes in a closed vessel with 16 fl.ounces (or 800 Cc.) of the alcohol; set aside for 48 hours, occasionally shaking until dissolved; add the liquid extract of liquorice; filter; pass sufficient of the alcohol through the filter to produce 20 fl.ounces (or 1000 Cc.) of the tincture. Dose, $\frac{1}{4}$ to 1 fl.drachm for repeated administration; for a single administration, $1\frac{1}{2}$ to 2 fl.drachms." <Br.

TINCTURA ALOES CROCATA. Elixir Proprietatis.

Under various titles a tincture of aloes, myrrh and saffron is official in several of the pharmacopœias. The above is the Swedish-Latin title, common title Aloetinktur med Saffron. The formula is aloes 3 parts, myrrh, saffron, each, 2 parts, diluted alcohol 70 parts. Make a tincture by maceration.

TINCTURA ALOES ET MYRRHÆ. U. S.

Tincture of Aloes and Myrrh. [Elixir Proprietatis].

Purified Aloes, No. 40 powder, 100 Gm. or $3\frac{1}{2}$ ounces av.

Myrrh, No. 40 powder, 100 Gm. or $3\frac{1}{2}$ ounces av.

Glycyrrhiza, No. 40 powder, 100 Gm. or $3\frac{1}{2}$ ounces av.

Alcohol,

Water, each, sufficient to make 1000 Cc. or 34 fl.ounces

"Mix alcohol 3 measures with water 1 measure as a menstruum. Macerate the powders with 750 Cc. (or $25\frac{1}{2}$ fl.ounces) of the menstruum, contained in a stoppered container, and in a moderately warm place, for 7 days, with occasional agitation; then filter through purified cotton or a plain paper filter and, when the liquid has entirely drained off pass enough of the menstruum through the filter to make the measure 1000 Cc. (or 34 fl.ounces)." <U. S.

This is the old "Elixir Proprietatis" somewhat changed, but improved by the addition of glycyrrhiza, which helps to mask the very bitter taste of the active drug.

Uses. It is employed as a laxative and regulator and for worms etc., being generally used by physicians and as a household remedy.

Average dose.—2 Cc. (30 minims).

TINCTURA AMARA. P. G. Bitter Tincture.

Under this title most European pharmacopœias have formulas differing somewhat from each other.

This is prepared by maceration or percolation from gentian, centaury, each, 3 parts; orange peel 2 parts, orange immature, zeodary, each, 1 part; diluted alcohol 50 parts. It is an aromatic bitter.

TINCTURA ARNICÆ. U. S. Tincture of Arnica.

[From the Flowers].

The U. S. P. formula is:

Arnica Flowers, No. 20 powder, 200 Gm. or 7 ounces av.

Diluted Alcohol, to make 1000 Cc. or 34 fl.ounces

"Macerate the arnica with 500 Cc. (or 17 fl.ounces) of diluted alcohol in a closed vessel, in a moderately warm place for 3 days, with occasional stirring, and express strongly. Repeat this operation twice successively with 250 Cc. (or 8½ fl.ounces) of diluted alcohol, macerating for 24 hours each time; then, having ascertained the volume of the united expressed liquids, macerate the residual marc for 6 hours with sufficient menstruum to make, approximately 1000 Cc. (or 34 fl.ounces), and express as before. Mix the expressed liquids, filter through paper, and pass sufficient diluted alcohol through the filter to make 1000 Cc. (or 34 fl.ounces) of tincture." <U. S.

Average dose.—1 Cc. (15 minims).

It should be noted that in the U. S. P. the tincture of Arnica Flowers only is official and in the Br. P. the tincture of Arnica Root only is given.

The arnica flowers can best be reduced to a coarse powder by rubbing them through a coarse sieve.

Tincture of arnica is chiefly used externally.

TINCTURA ARNICÆ. Br. Tincture of Arnica.

[From the Root].

Arnica Rhizome, No. 40 powder, 50 Gm. or 1 ounce

Alcohol, (70%), a sufficient quantity.

Make a tincture by percolation. The resulting tincture should measure 20 fl.ounces (or 1000 Cc.).

TINCTURA AROMATICA. P. G. Aromatic Tincture.

This is prepared by maceration or percolation from cinnamon 5 parts, ginger 2 parts, galangal root, cloves, cardamom, each, 1 part; and diluted alcohol 50 parts. It is used as an aromatic addition to other preparations.

TINCTURA ASAFÆTIDÆ. U. S., Br. Tincture of Asafetida.

The U. S. P. formula is:

Asafetida, well bruised, 200 Gm. or 4 ounces

Alcohol, a sufficient quantity,

To make 1000 Cc. or 20 fl.ounces

"Macerate the asafetida in a stoppered container in a moderately warm place, with 750 Cc. (or 15 fl.ounces) of alcohol during 3 days, with frequent agitation; then filter through purified cotton or a plain paper filter, and, when the liquid has drained off completely, pass enough alcohol through the residue to make 1000 Cc. (or 20 fl.ounces)." <U. S.

Average dose.—1 Cc. (15 minims).

The Br. P. formula is:

Asafetida, bruised, 200 Gm. or 4 ounces
Alcohol, (70%), a sufficient quantity.

Make a tincture by maceration, using at first 750 Cc. (or 15 fl.ounces) of the alcohol, and at last passing through the filter enough of the alcohol to make 1000 Cc. (or 20 fl.ounces) of the tincture. Dose, $\frac{1}{2}$ to 1 fl.drachm.

TINCTURA AURANTII AMARI. U. S.

Tincture of Bitter Orange Peel.

Bitter Orange Peel, No. 40 powder, 200 Gm. or 7 ounces av.
Alcohol,

Water, each, sufficient to make 1000 Cc. or 34 fl.ounces

"Mix alcohol 3 volumes with water 2 volumes as a menstruum. Moisten the powder with 80 Cc. (or $3\frac{5}{8}$ fl.ounces) of the menstruum, transfer it to a percolator and, without pressing, allow it to stand well-covered for 6 hours; then pack it firmly and pour upon it enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, allow it to stand for 24 hours, then allow the percolation to proceed slowly, gradually pouring on sufficient menstruum to obtain 1000 Cc. (or 34 fl.ounces) of tincture." < U. S.

Average dose.—1 Cc. (15 minims).

Tinctura Aurantii. Br. Tincture of Orange. Fresh bitter orange peel 250 Gm. (or 5 ounces), alcohol (90%), 1000 Cc. (or 20 fl.ounces). Cut the orange peel in small pieces and make a tincture by maceration. Dose, $\frac{1}{2}$ to 1 fl.drachm.

It may be assumed that whenever Tincture of Orange is prepared from the dry peel, the bitter orange peel should be used, as the flavor is much stronger than the flavor of sweet orange.

TINCTURA AURANTII COMPOSITA.

Fresh Orange Peel, cut fine,	120 Gm.
Cinchona Bark, in powder,	60 Gm.
Gentian Root, in powder,	30 Gm.
Alcohol, (60%),	1000 Gm.

Make a tincture by maceration.

TINCTURA AURANTII DULCIS. U. S.

Tincture of Sweet Orange Peel.

Sweet Orange Peel, from fresh fruit, in
thin shavings, cut fine, 200 Gm. or 7 ounces av.

Alcohol, sufficient to make 1000 Cc. or 34 fl.ounces

The orange peel should be as free from the inner white layer as possible, and should be cut into small pieces and macerated for 48 hours

with 1000 Cc. (or 34 fl.ounces) of alcohol. It is then to be placed in a conical percolator, loosely stoppered with a pledget of cotton, and, when drained, alcohol gradually poured upon it until 1000 Cc. (or 34 fl.ounces) of tincture is obtained. <U. S.

This tincture is used chiefly for flavoring and as there is great differences in oranges, they should be selected particularly with reference to the quantity and quality of oil in the peel. The white inner layer should be mostly cut away, and the peel cut fine, which is best done by chopping in a chopping bowl. It is then put into a wide-mouthed jar, and the bowl rinsed out with alcohol, which is to be added in the jar and frequently agitated during the 48 hours or longer while it is macerating.

Average dose.—4 Cc. (1 fl.drachm).

TINCTURA BALSAMICA. Fr.

Angelica root 10 Gm., summit flowers of hypericum 20 Gm., alcohol (80%), 720 Gm. Make a tincture by macerating 8 days. To the pressed-out liquid add aloes, myrrh and olibanum, each, 10 Gm.; balsam tolu and benzoin, each, 60 Gm. Macerate for 8 days with frequent agitation and filter.

TINCTURA BELLADONNÆ. Br. Tincture of Belladonna.

(From Belladonna Root).

Liquid Extract of Belladonna, 2 fl.ounces or 60 Cc.

Alcohol, (60%), a sufficient quantity.

"To the liquid extract of belladonna add enough of the alcohol to form thirty fl.ounces (or 900 Cc.) of the tincture; set aside for 24 hours; filter." <Br.

This tincture, when assayed by the process employed for liquid extract of belladonna, should yield not less than 0.048 nor more than 0.052 gramme of alkaloid. Dose, 5 to 15 minims.

TINCTURA BELLADONNÆ FOLIORUM. U. S.

Tincture of Belladonna Leaves.

Belladonna Leaves, in No. 60 powder, containing not less than 0.35 percent. of alkaloids,

100 Gm. or 3½ ounces av.

Diluted Alcohol, a sufficient quantity,

To make 1000 Cc. or 34 fl.ounces

"Moisten the powder with 40 Cc. (or 1⅜ fl.ounces) of diluted alcohol, transfer it to a percolator, and, without pressing the powder, allow it to stand, well-covered, for 3 hours; then pack it firmly and pour on enough diluted alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator,

macerate for 24 hours. Then allow the percolation to proceed slowly, gradually pouring on diluted alcohol until 1000 Cc. (or 34 fl.ounces) of percolate are obtained."

"Tincture of Belladonna Leaves, when assayed by the process given, should contain in 100 Cc. 0.035 Gm. of the alkaloids from Belladonna Leaves." <U. S.

Average dose.—0.5 Cc. (8 minims).

As most all reliable manufacturers of fluidextracts now furnish an assayed fluidextract of belladonna leaves, it is probably better to prepare this tincture by mixing

Fluidextract of Belladonna Leaves,	1 fl.ounce or part
Diluted Alcohol, sufficient to make	10 fl.ounces or parts

It should be noted that the U. S. P. gives a formula for tincture of belladonna leaves, only, and the Br. P. a formula representing belladonna root, only.

TINCTURA BENZOINI. U. S. Tincture of Benzoin.

Benzoin, in No. 40 powder,	200 Gm. or 2 ounces av.
Alcohol, sufficient to make	1000 Cc. or 10 fl.ounces

"Triturate the benzoin with 250 Cc. (or 2½ fl.ounces) of alcohol until a uniform magma is obtained. Transfer this to a stoppered container, with the aid of 500 Cc. (or 5 fl.ounces) of alcohol and set it aside in a moderately warm place, shaking frequently during three days. Then transfer the mixture to a paper filter, and, when the liquid has drained off completely, pour on enough alcohol to make 1000 Cc. (or 10 fl.ounces) of tincture." <U. S.

Average dose.—1 Cc. (15 minims).

This tincture is seldom given as medicine but is considerably used in making toilet preparations and as a preservative of lard and other fats which become rancid by standing.

TINCTURA BENZOINI COMPOSITA. U. S., Br.

Compound Tincture of Benzoin. Friar's Balsam.

The U. S. P. formula is:

Benzoin, in No. 40 powder,	100 Gm. or 3½ ounces av.
Purified Aloes, No. 40 powder,	20 Gm. or 310 grains
Storax,	80 Gm. or 2⅞ ounces av.
Balsam of Tolu,	40 Gm. or 1⅓ ounces av.
Alcohol, to make	1000 Cc. or 34 fl.ounces

"Triturate the benzoin and purified aloes with 250 Cc. (or 8½ fl.ounces) of alcohol until a uniform magma is obtained. Transfer this to a stoppered container with the aid of 500 Cc. (or 17 fl.ounces) of alcohol, add the storax and balsam of tolu and set the mixture aside in a moderately warm place, shaking it frequently during three

days; then transfer it to a paper filter, and when the liquid has drained off completely, pour on enough alcohol to make 1000 Cc. (or 34 fl.ounces) of tincture." <U. S.

Average dose.—2 Cc. (30 minims).

The Br. P. formula is:

Benzoin, in coarse powder,	100 Gm. or	2 ounces
Prepared Storax,	75 Gm. or	1½ ounces
Balsam of Tolu,	25 Gm. or	½ ounce
Socotrine Aloes,	18 Gm. or	160 grains

Alcohol, (90%), a sufficient quantity.

Make a tincture by macerating the drugs first with 800 Cc. (or 16 fl.ounces) of alcohol, and then filtering and adding enough alcohol through the filter to produce 1000 Cc. (or 20 fl.ounces) of tincture.

TINCTURA BUCHU. Br. Tincture of Buchu.

Buchu Leaves, No. 20 powder, 200 Gm. or 4 ounces

Alcohol, (60%), a sufficient quantity.

"Moisten the powder with 4 fl.ounces (or 200 Cc.) of the alcohol, and complete the percolation process. The resulting tincture should measure 20 fl.ounces (or 1000 Cc.). Dose, ½ to 1 fl.drachm." <Br.

Used chiefly as a diuretic and for catarrhal conditions of the bladder.

TINCTURA CALAMI. P. G. Tincture of Calamus.

Calamus 1 part, alcohol 5 parts. Prepare a tincture by maceration or percolation.

This is used as a stomachic and for flavoring other preparations.

TINCTURA CALENDULA. U. S. Tincture of Calendula. Marigold.

Calendula, in No. 60 powder, 200 Gm. or 7 ounces av.

Alcohol, sufficient to make 1000 Cc. or 34 fl.ounces

"Moisten the calendula with 80 Cc. (or 2¾ fl.ounces) of alcohol, transfer it to a percolator and, without pressing the powder, allow it to stand, well covered, for 6 hours; then pack it very firmly and pour on enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop close the lower orifice, and, having closely covered the percolator, macerate for 24 hours. Then allow the percolation to proceed slowly, pouring on it sufficient alcohol to obtain 1000 Cc. (or 34 fl.ounces) of tincture." <U. S.

This tincture is almost entirely used externally like tincture of arnica, as an application for cuts, wounds, bruises etc., and it would seem that, unless much diluted, the alcoholic menstruum would be too strong. A good tincture may be made with diluted alcohol and would, we think, give better general satisfaction.

This may be made by water-bath percolation in the same manner as is directed for making tincture of arnica flowers.

The calendula flowers or florets, when dry, can be reduced to a coarse powder by rubbing through a coarse sieve.

It is used for similar purposes as tincture of arnica.

The B. P. C. Form., 1901, directs marigold flowers, in No. 20 powder, 4 ounces av., with alcohol (60%), a sufficient quantity to produce by percolation 20 fl.ounces.

TINCTURA CALUMBÆ. U. S., Br. Tincture of Calumba.

The U. S. formula is:

Calumba, in No. 20 powder,	200 Gm. or 7 ounces av.
Alcohol,	
Water, each, a sufficient quantity	
To make	1000 Cc. or 34 fl.ounces

Mix alcohol 3 measures with water 2 measures as a menstruum. Moisten the calumba with 100 Cc. (or 3½ fl.ounces) of the menstruum, transfer it to a percolator, and, without pressing the powder, allow it to stand, well covered, for 24 hours; then pack it moderately, pour on enough of the menstruum to saturate the powder and leave a stratum above it, and allow the percolation to proceed slowly, pouring on sufficient menstruum to obtain 1000 Cc. (or 34 fl.ounces) of tincture. <U. S.

Average dose.—4 Cc. (1 fl.drachm).

The Br. P. formula is:

Calumba Root, No. 20 powder,	100 Gm. or 2 ounces av.
Alcohol, (60%),	1000 Cc. or 20 fl.ounces

Prepare by the maceration process, making a 10% tincture.
Dose, ½ to 1 fl.drachm.

TINCTURA CAMPHORÆ COMPOSITA. Br.

Compound Tincture of Camphor. Paregoric. Paregoric Elixir.

The Br. P. gives the following formula under the above title, the preparation corresponding nearly to the U. S. P. Tinctura Opii Camphorata (which see).

Tincture of Opium,	60.9 Cc. or 585 minims
Camphor,	3.4 Gm. or 30 grains
Benzoic Acid,	4.6 Gm. or 40 grains
Oil of Anise,	3.1 Gm. or 30 minims
Alcohol, a sufficient quantity.	

"Dissolve the benzoic acid, camphor and oil of anise in 900 Cc. (or 18 fl.ounces) of the alcohol; add the tincture of opium and a sufficient quantity of alcohol to produce 1000 Cc. (or 20 fl.ounces) of the tincture, filter if necessary." <Br.

Dose, ½ to 1 fl.drachm. A fl.drachm contains ¼ grain of opium (containing 10 percent. of anhydrous morphine), equivalent to 1/30 grain of morphine hydrochloride.

TINCTURA CANNABIS INDICÆ. U. S., Br.**Tincture of Indian Cannabis. U. S. Tincture of Indian Hemp. Br.**

The U. S. formula is:

Indian Cannabis, in No. 40 powder,

100 Gm. or $3\frac{1}{2}$ ounces av.

Alcohol, sufficient to make 1000 Cc. or 34 fl.ounces

"Moisten the Indian Cannabis with 50 Cc. (or $1\frac{3}{4}$ fl.ounces) of alcohol, transfer it to a percolator, and, without pressing the powder, allow it to stand, well covered, for 6 hours; then pack it very firmly and pour on enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 24 hours. Then allow the percolation to proceed slowly, pouring on sufficient alcohol to obtain 1000 Cc. (or 34 fl.ounces) of tincture." <U. S.

Average dose.—0.6 Cc. (10 minims).

Owing to the small proportion of the drug used, this can readily be made by maceration instead of by percolation, or from the fluid-extract as follows:

Fluidextract of Cannabis Indica, 1 fl.ounce

Alcohol, 9 fl.ounces

Mix them.

The Br. P. formula is:

Extract of Indian Hemp, 50 Gm. or 1 ounce

Alcohol, (90%), a sufficient quantity.

"Dissolve the Extract of Indian Hemp in 900 Cc. (or 18 fl.ounces) of alcohol; filter if necessary; add sufficient of the alcohol to produce 1000 Cc. (or 20 fl.ounces) of the tincture." <Br.

Dose, 5 to 15 minims.

TINCTURA CANTHARIDIS. U. S., Br. Tincture of Cantharides.

The U. S. formula is:

Cantharides, in No. 60 powder, 100 Gm. or $3\frac{1}{2}$ ounces av.

Alcohol, sufficient to make 1000 Cc. or 34 fl.ounces

"Moisten the cantharides with 35 Cc. (or 1 ounce) of alcohol, transfer it to a percolator, and, without pressing the powder, allow it to stand, well covered, for 6 hours; then pack it very firmly and pour on enough alcohol to saturate the drug and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 24 hours. Then allow the percolation to proceed slowly, pouring on sufficient alcohol to obtain 1000 Cc. (or 34 fl.ounces) of tincture." <U. S.

Average dose.—0.3 Cc. (5 minims).

As the quantity of drug directed in this formula is small it may readily be prepared by the maceration process.

The U. S. tincture of cantharides contains 10 percent. of cantharides.

The Br. P. formula is:

Cantharides, No. 40 powder, $12\frac{1}{2}$ Gm. or $\frac{1}{4}$ ounce
Alcohol, (90%), 1000 Cc. or 20 fl.ounces

Prepare by maceration process. Dose, 5 to 10 minims; if frequently repeated, 2 to 5 minims.

The Br. tincture represents only $1\frac{1}{4}$ percent. of the drug.

TINCTURA CAPSICI. U. S., Br. Tincture of Capsicum.

The U. S. formula is:

Capsicum, No. 30 powder, 100 Gm. or $3\frac{1}{2}$ ounces av.
Alcohol,

Water, each, sufficient to make 1000 Cc. or 34 fl.ounces

"Mix 950 Cc. (or $33\frac{1}{4}$ fl.ounces) of alcohol with 50 Cc. (or $1\frac{3}{4}$ fl.ounces) of water as a menstruum. Moisten the capsicum with 35 Cc. (or $1\frac{1}{4}$ fl.ounces) of the menstruum, transfer it to a percolator, and, without pressing the powder, allow it to stand, well covered, for 6 hours; then pack it firmly and pour on enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 24 hours. Then allow the percolation to proceed slowly, pouring on sufficient menstruum to obtain 1000 Cc. (or 34 fl.ounces) of tincture." <U. S.

Average dose.—0.5 Cc. (8 minims).

Owing to the small proportion of the drug this tincture may readily be made by macerating it with the required quantity of the menstruum in a closed vessel for 7 days, then filtering and adding enough menstruum through the filter to make the required quantity.

The Br. P. formula is only one-half the strength of the U. S. Capsicum, No. 20 powder, 50 Gm. (or 1 ounce); alcohol, (70%), 1000 Cc. (or 20 fl.ounces). Prepare by the maceration process. Dose, 5 to 15 minims.

Tincture of capsicum is much used externally in liniments, and is given as a warm stimulant in doses corresponding to its strength.

Tinctura Capsici Fortior. Stronger Tincture of Capsicum. B. P. C. Form., 1901. Capsicum in No. 40 powder, 10 ounces av.; alcohol, (90%), a sufficient quantity. Make 20 fl.ounces of tincture by percolation. Dose, 1 to 3 minims, principally used externally.

This is one-half the drug strength of the U. S. P. fluidextract of capsicum, but is in reality, nearly as strong, as the full quantity of capsicum cannot well be represented in an equivalent measure of fluidextract.

TINCTURA CARDAMOMI. U. S. Tincture of Cardamom.

The U. S. P. formula is:

Cardamom, in No. 30 powder, 200 Gm. or 2 ounces av.
Diluted Alcohol, a sufficient quantity

To make 1000 Cc. or 10 fl.ounces

"Moisten the cardamom with 80 Cc. (or 1 fl.ounce) of diluted alcohol, transfer it to a percolator, and, without pressing the powder, allow it to stand, well covered, for 6 hours; then pack it firmly and pour on enough diluted alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 24 hours. Then allow the percolation to proceed slowly, pouring on sufficient diluted alcohol to obtain 1000 Cc. (or 10 fl.ounces) of tincture." <U. S.

This is used to flavor medicines and given as an aromatic stimulant. Average dose.—4 Cc. (1 fl.drachm).

TINCTURA CARDAMOMI COMPOSITA. U. S., Br.**Compound Tincture of Cardamom.**

Cardamom,	25 Gm. or 386	grains
Saigon Cinnamon,	25 Gm. or 386	grains
Caraway,	12 Gm. or 185	grains
Cochineal,	5 Gm. or 77	grains
Glycerin,	60 Cc. or 1 $\frac{3}{4}$	fl.ounces
Diluted Alcohol, a sufficient quantity		

To make 1000 Cc. or 33 $\frac{3}{4}$ fl.ounces

The dry drugs are to be reduced to a powder and macerated with 750 Cc. (or 25 $\frac{1}{2}$ fl.ounces) of a menstruum composed of the glycerin mixed with 950 Cc. (or 32 fl.ounces) of diluted alcohol, during 7 days, with occasional agitation. This is then to be filtered through purified cotton or plain filter paper and when the liquid has completely drained off the remainder of the menstruum is to be poured upon the residue in the filter, and then enough diluted alcohol to make 1000 Cc. (or 33 $\frac{3}{4}$ fl.ounces) of the tincture. <U. S.

Average dose.—4 Cc. (1 fl.drachm).

The Br. P. formula is:

Cardamom Seeds, bruised,	12.5 Gm. or $\frac{1}{4}$	ounce
Caraway Seed, bruised,	12.5 Gm. or $\frac{1}{4}$	ounce
Raisins of commerce, seedless,	100 Gm. or 2	ounces
Cinnamon Bark, bruised,	25 Gm. or $\frac{1}{2}$	ounce
Cochineal, in powder,	6.3 Gm. or 55	grains
Alcohol, (60%),	1000 Cc. or 20	fl.ounces

Prepare by the process of maceration. Dose, $\frac{1}{2}$ to 1 fl.drachm.

This is a pleasant aromatic, used chiefly for flavoring other preparations. Dose, a teaspoonful. It is quite a favorite addition to biters or other stomachics, in which it is used chiefly as a flavoring.

TINCTURA CARMINATIVA. B. P. C. Carminative Tincture.

Cardamom Seeds, bruised,	600 grains
Stronger Tincture of Ginger,	1¼ fl.ounces
Oil of Cinnamon,	100 minims
Oil of Caraway,	100 minims
Oil of Cloves,	100 minims
Alcohol, (90%), sufficient to produce	20 fl.ounces

Macerate the cardamoms in 15 fl.ounces of the alcohol for a week, then decant, express and dissolve the oils in the mixed tinctures, adding enough alcohol to make 20 fl.ounces. Dose, 2 to 10 minims.

TINCTURA CASCARILLÆ. Br. Tincture Cascarilla.

Cascarilla, No. 40 powder,	200 Gm. or 4 ounces
Alcohol, (70%), a sufficient quantity.	

"Moisten the powder with 150 Cc. (or 3 ounces) of the alcohol, and complete the percolation process. The resulting tincture should measure 1000 Cc. (or 20 fl.ounces)." < Br. Dose, ½ to 1 fl.drachm.

TINCTURA CASTOREI. Tincture of Castor.

Castor,	1 part
Alcohol,	10 parts

Make by maceration. It is given as an antispasmodic. Dose, 20 to 60 minims. It is now official in several European pharmacopœias.

TINCTURA CATECHU. Br. Tincture of Catechu.

Catechu, in coarse powder,	200 Gm. or 4 ounces
Cinnamon Bark, bruised,	50 Gm. or 1 ounce
Alcohol, (60%)	1000 Cc. or 20 fl.ounces

Prepare by the maceration process. Dose, ½ to 1 fl.drachm. < Br. This is similar to but much stronger than the U. S. P. Compound Tincture of Gambir.

TINCTURA CHIRATÆ. Br. Tincture of Chiretta.

Chiretta, in No. 40 powder,	100 Gm. or 2 ounces
Alcohol, (60%),	1000 Cc. or 20 fl.ounces

Prepare by the maceration process. Dose, ½ to 1 fl.drachm. This is a bitter stomachic, similar to tincture of gentian.

TINCTURA CHLOROFORMI COMPOSITA. B. P. C. Compound Tincture of Chloroform.

Chloroform,	2 fl.ounces
Alcohol, (90%),	8 fl.ounces
Compound Tincture of Cardamoms,	10 fl.ounces

Mix. Dose, 5 to 60 minims.

TINCTURA CHLOROFORMI ET MORPHINÆ COMPOSITA.**Br. Compound Tincture of Chloroform and Morphine.****[Commonly known as Chlorodyne].**

Chloroform,	75 Cc. or 1½ fl.ounces
Morphine Hydrochloride,	10 Gm. or 87½ grains
Diluted Hydrocyanic Acid,	50 Cc. or 1 fl.ounce
Tincture of Capsicum,	25 Cc. or ½ fl.ounce
Tincture Indian Hemp,	100 Cc. or 2 fl.ounces
Oil of Peppermint,	1.5 Cc. or 14 minims
Glycerin,	250 Cc. or 5 fl.ounces

Alcohol, (90%), a sufficient quantity.

“Mix the chloroform, tincture of capsicum, tincture of Indian hemp, oil of peppermint and glycerin with 9 fl.ounces (or 450 Cc.) of the alcohol, and dissolve the morphine hydrochloride in the mixture; add the diluted hydrochloric acid; then mix with enough of the alcohol to form 20 Imp. fl.ounces (or 1000 Cc.) of the compound tincture.”

<Br.

Dose, 5 to 15 minims. This preparation contains in a 10 minim dose, $\frac{3}{4}$ minim of chloroform, $\frac{1}{2}$ minim diluted hydrocyanic acid, and $\frac{1}{11}$ grain of morphine hydrochloride.

TINCTURA CIMICIFUGÆ. U. S., Br.**Tincture of Cimicifuga. [Black Cohosh]. Tincture of Actæa.**

Cimicifuga, No. 40 powder, 200 Gm. or 7 ounces av.

Alcohol, sufficient to make 1000 Cc. or 34 fl.ounces

“Moisten the cimicifuga with 60 Cc. (or 2 fl.ounces) of alcohol, transfer it to a percolator, and, without pressing the powder, allow it to stand, well covered, for 6 hours; then pack it firmly and pour on enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator close the lower orifice, and, having closely covered the percolator, macerate for 24 hours. Then allow the percolation to proceed slowly, pouring on sufficient alcohol to obtain 1000 Cc. (or 34 fl.ounces) of tincture.”

<U. S.

Average dose.—4 Cc. (1 fl.drachm).

Made by Water-Bath Percolation.

Take the ingredients as directed in the U. S. formula. Moisten the powder with 3 ounces of alcohol and pack firmly in the water-bath percolator, pour upon it half a pint of alcohol and set in a warm place for 2 days, then heat moderately, and, after 1 hour, begin to percolate, adding alcohol to the drug and continuing the heat and percolation until 34 fl.ounces of the tincture have passed.

This is given as a tonic and anti-rheumatic in doses of 15 to 60 minims.

The Br. P. formula is:

Cimicifuga, No. 40 powder, 100 Gm. or 2 ounces

Alcohol, (60%), a sufficient quantity.

"Moisten the powder with 50 Cc. (or 1 fl.ounce) of the alcohol and complete the percolation process. The resulting tincture should measure 1000 Cc. (or 20 fl.ounces). Dose, $\frac{1}{2}$ to 1 fl.drachm." < Br.

This is only half the strength of the U. S. tincture.

TINCTURA CINCHONÆ. U. S., Br. Tincture of Cinchona.

The U. S. P. formula is:

Cinchona, in No. 60 powder, (yielding not less than
4 percent. of anhydrous ether-soluble alkaloids),

200 Gm. or 7 ounces av.

Glycerin,

75 Cc. or $2\frac{1}{2}$ fl.ounces

Alcohol,

Water, each a sufficient quantity

To make 1000 Cc. or 34 fl.ounces

"Mix the glycerin with 675 Cc. (or 23 fl.ounces) of alcohol and 250 Cc. (or $8\frac{3}{8}$ fl.ounces) of water. Moisten the cinchona with 80 Cc. (or $2\frac{3}{4}$ fl.ounces) of the menstruum, transfer it to a percolator, and, without pressing the powder, allow it to stand, well covered, for 6 hours; then pack it firmly and pour on enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator close the percolator, macerate for 48 hours. Then allow the percolation to proceed slowly, pouring on first the remainder of the menstruum, and then sufficient of a mixture of alcohol and water made in the same proportion as before, until 1000 Cc. (or 34 fl.ounces) of percolate are obtained."

"Tincture of Cinchona, when assayed by the process given, should contain in 100 Cc. 0.75 Gm. of anhydrous ether-soluble alkaloids of cinchona." < U. S.

Average dose.—4 Cc. (1 fl.drachm).

As assayed Fluidextract of Cinchona may be had from reliable manufacturing houses it may be as well to prepare the tincture of cinchona from it by mixing

Fluidextract of Cinchona, 1 fl.ounce

Alcohol, (70%), enough to make 5 fl.ounces

Made by Water-Bath Percolation.

Take the ingredients as directed in the U. S. formula. Mix the glycerin with 20 fl.ounces of alcohol and 8 fl.ounces of water, moisten the powder with 6 ounces of the mixture and macerate in a closed vessel for 24 hours; transfer it then to the water-bath percolator, pack firmly, pour upon it the remainder of the mixture and set in a warm

place for 24 hours, then heat very moderately, and, after 1 hour, begin to percolate. When the liquid has disappeared from the surface, add through the percolator enough alcohol and water, mixed in the same proportion, to complete the percolation, and make 34 fl.ounces of the tincture. Lastly, after standing a few days, filter through paper.

The Br. P. formula is:

Red Cinchona Bark, in No. 40 powder, 200 Gm. or 4 ounces

Alcohol, (70%), a sufficient quantity.

“Moisten the powdered bark with 200 Cc. (or 4 ounces) of the alcohol; set aside for 24 hours in a closed vessel; percolate with more of the alcohol until 700 Cc. (or 14 fl.ounces) of percolate have been collected; press the marc; add the expressed liquid to the percolate; set aside for 24 hours; filter.” < Br.

This tincture is then to be assayed as directed by the assay process for *Extractum Cinchonæ Liquidum*, and a sufficient quantity of the alcohol added so that 100 Cc. of the tincture shall contain 1 Gm. of the alkaloids. Dose, $\frac{1}{2}$ to 1 fl.drachm.

TINCTURA CINCHONÆ COMPOSITA. U. S., Br.

Compound Tincture of Cinchona. Huxham's Tincture.

Red Cinchona, (yielding not less than 5 percent.
of anhydrous ether-soluble alkaloids),

	100 Gm. or	3½ ounces av.
Bitter Orange Peel,	80 Gm. or	2¾ ounces av.
Serpentaria,	20 Gm. or	300 grains
Alcohol,		

Water, each, sufficient to make 1000 Cc. or 34 fl.ounces

The glycerin is to be mixed with 650 Cc. (or 23 fl.ounces) of alcohol, and 250 Cc. (or 8¾ fl.ounces) of water, as a menstruum. The drugs are to be reduced to a fine (No. 60) powder, moistened with 80 Cc. (or 2¾ fl.ounces) of the menstruum and macerated without pressure in a well covered percolator for 6 hours. The powder is then to be packed firmly in a percolator, the remainder of the menstruum poured upon it and macerated for 48 hours, the percolation is then to proceed slowly, and when the liquid has disappeared from the surface, alcohol and water, mixed in the same proportions as before, is to be poured on and the percolation continued until 1000 Cc. (or 34 fl.ounces) are obtained. < U. S.

Average dose.—4 Cc. (1 fl.drachm).

Made by Water-Bath Percolation.

This may be made by water-bath percolation, with the ingredients of the U. S. P. formula as above, in the same manner as is directed for making Tincture Cinchona preceding.

The Br. P. formula is:

Dried Bitter Orange Peel, well bruised,	50 Gm. or 1 ounce
Serpentary Rhizome, No. 40 powder,	25 Gm. or $\frac{1}{2}$ ounce
Cochineal, in powder,	3.2 Gm. or 28 grains
Saffron,	6.3 Gm. or 55 grains
Tincture of Cinchona,	500 Cc. or 10 fl.ounces
Alcohol, (70%), a sufficient quantity.	

"Mix the solid ingredients with 500 Cc. (or 10 fl.ounces) of the alcohol; set aside in a closed vessel for 7 days, agitating frequently; strain; press the marc; mix the liquids; add the tincture of cinchona and enough of the alcohol to produce 1000 Cc. (or 20 fl.ounces) of the compound tincture; set aside for 24 hours; filter. Dose, $\frac{1}{2}$ to 1 fl.drachm." < Br.

TINCTURA CINNAMOMI. U. S., Br. Tincture of Cinnamon.

The U. S. formula is:

Saigon Cinnamon, No. 50 powder,	200 Gm. or 7 ounces av.
Glycerin,	75 Cc. or $2\frac{1}{2}$ fl.ounces
Alcohol,	
Water, each a sufficient quantity	
To make	1000 Cc. or 34 fl.ounces

The glycerin is to be mixed with 675 Cc. (or 23 fl.ounces) of alcohol and 250 Cc. (or $8\frac{3}{8}$ fl.ounces) of water. The powder is to be moistened with 80 Cc. (or $2\frac{1}{2}$ fl.ounces) of the menstruum and transferred to a percolator without pressure and macerated 6 hours. It is then to be firmly packed and enough menstruum poured upon it to saturate the powder and leave a stratum above. When the liquid begins to drop from the percolator the lower orifice is to be closed, and, having covered the percolator closely it is allowed to macerate for 24 hours. The percolation is then allowed to proceed slowly, the remainder of the menstruum poured on and, after it has disappeared from the surface, the percolation continued with alcohol and water mixed in the same proportion until 1000 Cc. (or 34 fl.ounces) of percolate has passed." < U. S.

Average dose.—2 Cc. (30 minims).

This is used as an aromatic addition to medicines and as a warm carminative.

Made by Water-Bath Percolation.

Make a tincture of the ingredients named above by water-bath percolation in the same manner as Tincture Cinchona.

The Br. P. formula is:

Cinnamon Bark, in No. 40 powder, 200 Gm. or 4 ounces

Alcohol, (70%), a sufficient quantity.

"Moisten the powder with 200 Cc. (or 4 fl.ounces) of the alcohol and complete the percolation process. The resulting tincture should measure 1000 Cc. (or 20 fl.ounces)." <Br.

Dose, $\frac{1}{2}$ to 1 fl.drachm. This is the same as the U. S., except the addition of glycerin in the U. S.

TINCTURA COCCI. Br. Tincture of Cochineal.

Alcohol, (45%), 1000 Cc. or 20 fl.ounces

Cochineal, in powder, 100 Gm. or 2 ounces

Prepare by the maceration process. Dose, 5 to 15 minims.

This may be improved by adding 30 grains of potassium carbonate.

TINCTURA COLCHICI SEMINIS. U. S.

Tincture of Colchicum Seed.

The U. S. P. formula is:

Colchicum Seed, in No. 50 powder, (containing not

less than 0.55 percent. of colchicine),

100 Gm. or $3\frac{1}{2}$ ounces av.

Alcohol,

Water, each a sufficient quantity

To make 1000 Cc. or 34 fl.ounces

Mix alcohol 3 measures with water 2 measures as a menstruum. Moisten the colchicum seed with 40 Cc. (or $1\frac{3}{8}$ fl.ounces) of the menstruum and transfer to a percolator without pressing; let stand 6 hours; then pack firmly and pour upon the powder enough menstruum to saturate and leave a stratum of liquid above it. When the liquid begins to drop close the lower orifice and, having closely covered the percolator, macerate for 48 hours. Then allow the percolation to proceed slowly, pouring on sufficient menstruum to obtain 1000 Cc. (or 34 fl.ounces) of percolate. <U. S.

"Tincture of Colchicum seed, when assayed by the process given, should contain in 100 Cc. 0.05 Gm. of colchicine." <U. S.

Average dose.—2 Cc. (30 minims).

Assayed fluidextract of colchicum seed may be had from reliable manufacturers and the tincture (as above) may be made by mixing it with a menstruum of alcohol 3 measures with water 2 measures in the proportion of $3\frac{1}{2}$ fl.ounces of the fluidextract with $30\frac{1}{2}$ fl.ounces of the menstruum.

Made by Water-Bath Percolation.

Take the ingredients as directed in the U. S. formula and make a tincture by water-bath percolation in the same manner as is directed for tincture of arnica root.

Tinctura Colchici Seminum. Br. Tincture of Colchicum Seeds.

Colchicum Seeds, No. 30 powder, 200 Gm. or 4 ounces

Alcohol, (45%), a sufficient quantity.

"Moisten the powder with 125 Cc. (or 2½ fl.ounces) of alcohol, and complete the percolation process. The resulting tincture should measure 1000 Cc. (or 20 fl.ounces). This makes a 20% tincture, while the U. S. is but 15%. Dose, 5 to 15 minims." < Br.

TINCTURA CONII. Br. Tincture of Conium.**Tincture of Hemlock.**

Conium Fruit, recently reduced

to No. 40 powder, 200 Gm. or 4 ounces

Alcohol, (70%), a sufficient quantity.

"Moisten the powder with 200 Cc. (or 4 fl.ounces) of the alcohol, and complete the percolation process. The resulting tincture should measure 1000 Cc. (or 20 fl.ounces)." < Br. Dose, ½ to 1 fl.drachm.

This is a sedative, the dose being 20 to 60 minims.

TINCTURA CONVALARIÆ. B. P. C.**Tincture of Lily of the Valley.**

Lily of the Valley, flowers and stalks, dried,

in No. 20 powder, 2½ ounces

Alcohol, (60%), a sufficient quantity.

Make 20 fl.ounces of tincture by percolation. Dose, 5 to 20 minims.

TINCTURA COTO. B. P. C. Tincture of Coto.

Coto Bark, bruised, 2 ounces

Alcohol, (90%), a sufficient quantity.

Macerate with 20 fl.ounces of alcohol for 7 days, with occasional agitation; then press, filter, and add sufficient of the alcohol to produce 20 fl.ounces. Dose, 10 to 30 minims.

TINCTURA CROCI. Br. Tincture of Saffron.

Saffron, 50 Gm. or 1 ounce

Alcohol, (60%), 1000 Cc. or 20 fl.ounces

Prepare by the maceration process. Dose, 5 to 15 minims.

This is designed to be made from the foreign saffron (*Crocus Sativus*). Many American druggists do not use this because of its high price, but use in its place the American Saffron or Safflower (*Carthamus Tinctorius*), which much resembles it.

Other pharmacopœias except the Br. direct a 10% tincture to be made, the same as the former U. S. preparation. The Br. is 5%.

Tincture of saffron is an aromatic, used to add to other preparations and for its orange color. It is given in doses of ½ to 1 teaspoonful, but is used chiefly for its coloring and aroma.

TINCTURA CUBEBAE. Br. Tincture of Cubebs.

Cubebs, in powder, 200 Gm. or 4 ounces

Alcohol, (90%), a sufficient quantity.

"Moisten the powder with 100 Cc. (or 2 ounces) of the alcohol, and complete the percolation process. The resulting tincture should measure 1000 Cc. (or 20 fl.ounces). Dose, $\frac{1}{2}$ to 1 fl.drachm." < Br.

This is given as a stimulant to the mucous membrane in doses of $\frac{1}{2}$ to 2 fl.drachms.

TINCTURA DIGITALIS. U. S., Br. Tincture of Digitalis.

The U. S. P. formula is:

Digitalis, in No. 60 powder, 100 Gm. or $3\frac{1}{2}$ ounces av.

Diluted Alcohol, a sufficient quantity

To make 1000 Cc. or 34 fl.ounces

"Moisten the digitalis with 40 Cc. (or $1\frac{3}{8}$ fl.ounces) of diluted alcohol, transfer it to a percolator, and, without pressing the powder, allow it to stand, well covered, for 6 hours; then pack it firmly and pour on enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 24 hours. Then allow the percolation to proceed slowly, pouring on sufficient diluted alcohol to obtain 1000 Cc. (or 34 fl.ounces) of percolate." < U. S.

Average dose.—1 Cc. (15 minims).

The Br. P. formula is:

Digitalis Leaves, (No. 20 powder), 125 Gm. or $2\frac{1}{2}$ ounces

Alcohol, (60%), a sufficient quantity.

"Moisten the powder with 100 Cc. (or 2 fl.ounces) of the alcohol, and complete the percolation process. The resulting tincture should measure 1000 Cc. (or 20 fl.ounces). Dose, 5 to 15 minims." < Br.

Made by Water-Bath Percolation.

Take the ingredients directed in the U. S. formula and make by water-bath percolation in the same manner as is directed for making Tincture Belladonna.

TINCTURA ERGOTÆ AMMONIATA. Br.

Ammoniated Tincture of Ergot.

Ergot, in No. 20 powder, 250 Gm. or 5 ounces

Solution of Ammonia, 100 Cc. or 2 fl.ounces

Alcohol, (60%), a sufficient quantity.

"Mix the solution of ammonia with 900 Cc. (or 18 fl.ounces) of the alcohol; moisten the powder with 100 Cc. (or 2 fl.ounces) of this mixture, and percolate with the remainder; press the marc; mix the expressed liquid with the percolate; add enough of the alcohol to form

1000 Cc. (or 20 fl.ounces) of the tincture; set aside for 24 hours; filter. Dose, $\frac{1}{2}$ to 1 fl.drachm." < Br.

This represents 25% of the drug.

TINCTURA EUONYMI. B. P. C. Tincture of Euonymus.

Euonymus Bark, in No. 20 powder, 4 ounces av.

Alcohol, (90%), a sufficient quantity.

Make a tincture by maceration and percolation, to produce 20 fl.ounces. Dose, 10 to 40 minims.

TINCTURA EUPHORBIAE PILULIFERÆ. B. P. C.

Euphorbia, in No. 20 powder, 4 ounces av.

Alcohol, (60%), a sufficient quantity.

Make 20 fl.ounces of tincture by maceration and percolation. Dose, 10 to 30 minims.

TINCTURA FERRI ACETICI ÆTHEREA.

Etherial Tincture Acetate of Iron.

This was formerly official in the P. G., the formula being:

Solution Acetate of Iron,	80 parts
Alcohol,	12 parts
Acetic Ether,	8 parts

It is now official in the Swiss P. under the above title. Solution ferrous acetate 8 parts, ether, alcohol, each, 1 part. Mix them.

Rademacher's Tincture of Acetate of Iron.

This is much better known than the former official tincture. The formula is therefore given:

Iron Sulphate, pure,	23 parts
Lead Acetate,	24 parts
Distilled Water,	48 parts
Good Vinegar,	96 parts
Alcohol,	80 parts

Triturate the iron sulphate and lead acetate together in a Wedgewood mortar until a thick magma results, then add gradually the water and vinegar, and pour the whole into a flask or bottle, which is to be kept at a temperature of 30° to 40°C. (86° to 104°F.), for 3 days, occasionally shaking it well in a wide-mouthed bottle, only half filled and loosely covered with a plate of glass; then add 80 parts of alcohol and allow to stand 10 days more in the same flask, and finally filter. The dose is from 5 to 10 minims.

TINCTURA FERRI CHLORIDI. U. S.

Tincture of Ferric Chloride. Tincture Muriate of Iron.

"A hydro-alcoholic solution of ferric chloride, Fe_2Cl_6 , containing about 13.28 percent, of the anhydrous salt, and corresponding to about 4.6 (4.58) percent. of metallic iron." < U. S.

Solution of Ferric Chloride, 350 Cc. or 11 fl.oz.+400 min.

Alcohol, sufficient to make 1000 Cc. or 33¾ fl.ounces

The solution is to be mixed with enough alcohol to make 1000 Cc. (or 33¾ fl.ounces), and the tincture allowed to stand in a closely covered vessel for at least three months. It is then to be transferred to glass-stoppered bottles and kept protected from light. <U. S.

Tincture of iron is one of the best known preparations of iron, acting as a tonic and astringent. The dose is from 10 to 30 minims, which should be diluted and taken through a tube to prevent blackening the teeth.

A so-called Tasteless Tincture of Iron is considerably used.

Tinctura Ferri Perchloridi. Br. Tincture of Ferric Chloride. This corresponds to the Tincture Ferric Chloride of the U. S. The formula is: "Strong solution of ferric chloride 250 Cc. (or 5 fl.ounces), alcohol, (90%), 250 Cc. (or 5 fl.ounces), distilled water, a sufficient quantity. Mix the strong solution of ferric chloride with the alcohol, add sufficient distilled water to produce 20 fl.ounces (or 1000 Cc.). Dose, 5 to 15 minims." <Br.

TINCTURA GALLÆ. U. S. Tincture of Nutgall.

Nutmeg, in No. 40 powder, 200 Gm. or 4½ ounces av.

Glycerin, 100 Cc. or 2 fl.ounces

Alcohol, sufficient to make 1000 Cc. or 20 fl.ounces

The glycerin is to be mixed with 900 Cc. (or 18 fl.ounces) of alcohol, as a menstruum. The powder is to be packed without moistening in a glass percolator, the menstruum poured upon it, and afterwards alcohol until 1000 Cc. (or 20 fl.ounces) of tincture are obtained. <U. S.

Average dose.—4 Cc. (1 fl.drachm).

This tincture is given as an astringent. Dose, ½ to 2 fl.drachms.

TINCTURA GAMBIR COMPOSITA. U. S.

Compound Tincture of Gambir.

[To replace Tinctura Catechu Composita, Pharm. 1890].

Gambir, in No. 50 powder, 50 Gm. or 1¾ ounces av.

Saigon Cinnamon, in No. 50 powder, 25 Gm. or ¾ ounce av.

Diluted Alcohol, a sufficient quantity

To make 1000 Cc. or 34 fl.ounces

"Macerate the gambir and Saigon cinnamon in a stoppered container, in a moderately warm place, with 750 Cc. (or 25½ fl.ounces) of diluted alcohol during 48 hours, with frequent agitation; then filter through purified cotton, or a plain filter, and when the liquid has drained off completely, pass enough menstruum through the residue to make 1000 Cc. (or 34 fl.ounces) of tincture." <U. S.

Average dose.—4 Cc. (1 fl.drachm). Employed as an astringent.

TINCTURA GELSEMII. U. S., Br.**Tincture of Gelsemium. [Yellow Jasmine].**

Gelsemium, No. 60 powder, 100 Gm. or 3½ ounces av.

Alcohol,

Water, of each, sufficient

To make

1000 Cc. or 34 fl.ounces

"Mix alcohol 6½ measures with water 3½ measures as a menstruum. Moisten the powder with 35 Cc. (or 1¼ fl.ounces) of the menstruum, transfer it to a percolator and without pressing the powder, allow it to stand, well covered, for 6 hours; then pack it firmly and pour on enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator close the lower orifice, and, having closely covered the percolator, macerate for 24 hours. Then allow the percolation to proceed slowly, pouring on sufficient menstruum to obtain 1000 Cc. (or 34 fl.ounces) of tincture." < U. S.

Average dose.—0.5 Cc. (8 minims).

Made by Water-Bath Percolation.

Take the ingredients directed in the U. S. formula, moisten the powder with 3 ounces of the menstruum, and pack firmly in a water-bath percolator, pour upon it half a pint of the menstruum and set in a warm place for 2 days, then heat very moderately, and, after 1 hour, begin to percolate, adding alcohol to the drug and continuing the heat and percolation until 34 fl.ounces of tincture have passed.

The Br. P. formula is:

Gelsemium Root, in No. 40 powder, 100 Gm. or 2 ounces

Alcohol, (60%), a sufficient quantity.

"Moisten the powder with 50 Cc. (or 1 fl.ounce) of the alcohol and complete the percolation process. The resulting tincture should measure 1000 Cc. (or 20 fl.ounces)." < Br. Dose, 5 to 15 minims. This tincture represents 10% of the drug, the same as the U. S.

A saturated tincture is also prepared from the green root, which is highly esteemed.

TINCTURA GENTIANÆ COMPOSITA. U. S., Br.**Compound Tincture of Gentian.**

Gentian, 100 Gm. or 3½ ounces av.

Bitter Orange Peel, 40 Gm. or 1¾ ounces av.

Cardamom, 10 Gm. or 154 grains

Alcohol,

Water, each, sufficient to make

1000 Cc. or 34 fl.ounces

"Mix alcohol 3 measures with water 2 measures as a menstruum. Reduce the drugs to No. 40 powder, moisten with 60 Cc. (or 2 fl.-

ounces) of the menstruum, transfer to a percolator without pressing the powder, allow to stand, well covered, for 12 hours; then pack moderately and pour on enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop close the lower orifice of the percolator, macerate for 12 hours, then allow the percolation to proceed slowly, pouring on sufficient menstruum to obtain 1000 Cc. (or 34 fl.ounces) of tincture." <U. S.

Average dose.—4 Cc. (1 fl.drachm).

This may be made by water-bath percolation, using the above ingredients in the same manner as directed for making tincture arnica root.

The Br. P. formula is:

Gentian Root, cut small, bruised,	100	Gm. or	2	ounces
Dried Bitter Orange Peel,	37.5	Gm. or	$\frac{3}{4}$	ounce
Cardamom Seeds, bruised,	12.5	Gm. or	$\frac{1}{4}$	ounce
Alcohol, (45%),	1000	Cc. or	20	fl.ounces

Prepare by the maceration process. <Br.

Dose, $\frac{1}{2}$ to 1 fl.drachm.

Tincture of Gentian is a bitter tonic, a popular remedy for dyspepsia and similar disorders. The dose is $\frac{1}{2}$ to 2 teaspoonfuls.

COMPOUND TINCTURE OF GENTIAN. IMPROVED.

Gentian, in coarse powder,	3	ounces av.
Cardamom, in fine powder,	$\frac{1}{2}$	ounce av.
Oranges, medium size, sweet,	three	
Alcohol,	1	pint
Water, sufficient to make	2	pints

Peel the oranges, squeeze out the juice and mix it with 12 fl.ounces each of alcohol and water, chop the orange peel fine, mix it with the gentian and cardamom, and, having moistened the drugs with 3 ounces of the mixture, macerate for 24 hours in a closed vessel. Transfer it then to a percolator, pack moderately, pour upon it the remainder of the mixture and set in a warm place for 2 days, then begin to percolate, pouring upon the drugs, after the liquid has disappeared from the surface, the remaining 4 ounces of alcohol mixed with 4 ounces of water, and continuing the percolation with water, if necessary, until 2 pints of tincture are obtained. Lastly, after standing a few days for the albuminous matter to separate, filter.

This makes an excellent compound tincture of gentian, of much better flavor than the official preparation.

TINCTURA GUAIACI. U. S. Tincture of Guaiac.

Guaiac, in No. 40 powder,	200	Gm. or	7	ounces av.
Alcohol, sufficient to make	1000	Cc. or	34	fl.ounces

The powder is to be mixed with 750 Cc. (or 25 fl.ounces) of alcohol and macerated in a closed vessel for 7 days, then filtered and

enough alcohol added through the filter to make the measure 1000 Cc. (or 34 fl.ounces). <U. S.

Average dose.—4 Cc. (1 fl.drachm).

The B. P. C. Form., 1901, directs guaiacum resin, in powder, 4 ounces; alcohol, (90%), a sufficient quantity to produce by maceration 20 fl.ounces. Dose, $\frac{1}{2}$ to 1 fl.drachm.

This tincture is given as an antirheumatic and laxative in doses of $\frac{1}{2}$ to 1 teaspoonful, diluted.

TINCTURA GUAIACI AMMONIATA. U. S., Br.

Ammoniated Tincture of Guaiac.

The U. S. formula is:

Guaiac, in No. 40 powder,	200 Gm. or 3½ ounces av.
Aromatic Spirit of Ammonia,	
sufficient to make	1000 Cc. or 17 fl.ounces

The powder is to be mixed with 750 Cc. (or 13 fl.ounces) of the aromatic spirit of ammonia, and macerated for 7 days in a closed vessel; then filtered through paper in a well-covered funnel and enough of the aromatic spirit of ammonia added through the filter to make the measure 1000 Cc. (or 17 fl.ounces). <U. S.

Average dose.—2 Cc. (30 minims).

The filter should be well covered during filtration to prevent the evaporation of the ammonia.

The Br. P. formula is:

Guaiaacum Resin, in powder,	200 Gm. or 4 ounces
Oil of Nutmeg,	3.1 Cc. or 30 minims
Oil of Lemon,	2.1 Cc. or 20 minims
Strong Solution of Ammonia,	75 Cc. or 1½ fl.ounce

"Mix the strong solution of ammonia with 800 Cc. (or 16 fl.ounces) of the alcohol, add the guaiacum resin, set aside in a closed vessel for 48 hours, shaking frequently; filter; dissolve the oil of nutmeg and lemon in the filtrate and pass sufficient of the alcohol through the filter to produce 1000 Cc. (or 20 fl.ounces) of the tincture. Dose, $\frac{1}{2}$ to 1 fl.drachm." <Br.

Tincture of Guaiac, Alkaline. An alkaline tincture of guaiac, not official, but known as **Dewee's Tincture of Guaiac**, is made with guaiac resin, in powder, 2 tr.ounces; potassium carbonate 45 grains; pimenta, in powder, 240 grains; diluted alcohol, sufficient to make 16 fl.ounces. Digest 2 weeks. Dose, 1 to 2 teaspoonfuls.

TINCTURA HAMAMELIDIS. Br.

Tincture of Hamamelis. [Witch Hazel].

Hamamelis Bark, No. 20 powder,	100 Gm. or 2 ounces
Alcohol, (45%), a sufficient quantity.	

"Moisten the powder with 50 Cc. (or 1 fl.ounce) of the alcohol and complete the percolation process. The resulting tincture should measure 1000 Cc. (or 20 fl.ounces)." < Br.

This represents 10% of the drug. Dose, $\frac{1}{2}$ to 1 fl.drachm.

TINCTURA HYDRASTIS. U. S., Br.

Tincture of Hydrastis. [Golden Seal].

The U. S. formula is:

Hydrastis, in No. 60 powder, (containing not less than
2.5 percent. of hydrastine), 200 Gm. or 7 ounces av.

Alcohol,

Water, each a sufficient quantity

To make 1000 Cc. or 34 fl.ounces

"Mix alcohol $6\frac{1}{2}$ measures with water $3\frac{1}{2}$ measures as a menstruum. Moisten the hydrastis with 60 Cc. (or 2 fl.ounces) of the menstruum, transfer it to a percolator, and, without pressing the powder, allow it to stand, well covered, for 6 hours; then pack it firmly and pour on enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, macerate for 24 hours. Then allow the percolation to proceed slowly, gradually adding menstruum until 1000 Cc. (or 34 fl.ounces) of percolate are obtained."

"Tincture of Hydrastis, when assayed by the process given, should contain in 100 Cc. 0.4 Gm. of hydrastine." < U. S.

This represents 20 percent. of the drug.

This tincture may be made by water-bath percolation in the same manner as is directed for Tincture of Gelsemium.

Tincture of hydrastis is a valuable tonic for the mucous membrane, and is employed as a remedy for dyspepsia and atonic conditions of the digestive tract; also locally as an ingredient of washes, injections, insufflations etc.

Average dose.—4 Cc. (1 fl.drachm).

As assayed fluidextract of hydrastis may be obtained from reliable manufacturers it is, perhaps, as well to make this tincture from the fluidextract by mixing

Fluidextract of Hydrastis, 1 fl.ounce

Menstruum, Alcohol $6\frac{1}{2}$ parts, Water $3\frac{1}{2}$ parts, 4 fl.ounces

The Br. P. formula is:

Hydrastis Rhizome, in No. 60 powder, 100 Gm. or 2 ounces

Alcohol, (60%), a sufficient quantity.

"Moisten the powder with 100 Cc. (or 2 fl.ounces) of the alcohol, and complete the percolation process. The resulting tincture should measure 1000 Cc. (or 20 fl.ounces)." < Br. Dose, $\frac{1}{2}$ to 1 fl.drachm.

This represents 10% of the drug.

TINCTURA HYOSCYAMI. U. S., Br. Tincture Hyoscyamus.

Hyoscyamus, in No. 60 powder. containing not less
than 0.08 percent. of mydriatic alkaloids),
100 Gm. or 3½ ounces av.

Diluted Alcohol, a sufficient quantity

To make 1000 Cc. or 34 fl.ounces

"Moisten the hyoscyamus with 40 Cc. (or 1⅓ fl.ounces) of diluted alcohol, transfer it to a percolator, and, without pressing the powder, allow it to stand, well covered, for 6 hours; then pack it firmly and pour on enough diluted alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 24 hours. Then allow the percolation to proceed slowly, gradually adding diluted alcohol until 1000 Cc. (or 34 fl.ounces) are obtained."

"Tincture of Hyoscyamus, when assayed by the process given, should contain in 100 Cc: 0.007 Gm. of mydriatic alkaloids." < U. S.

Average dose.—2 Cc. (30 minims).

This is a 10 percent. tincture.

As assayed fluidextract of hyoscyamus may be obtained from reliable manufacturers it is, perhaps, well to make this tincture from the fluidextract by mixing

Fluidextract of Hyoscyamus,	1 fl.ounce
Diluted Alcohol,	9 fl.ounces

Made by Water-Bath Percolation.

Take the ingredients as directed in the U. S. formula, and make a tincture by water-bath percolation in the same manner as is directed for tincture belladonna leaves.

The Br. P. formula is:

Hyoscyamus Leaves and Flowering Tops,
in No. 20 powder, 100 Gm. or 2 ounces

Alcohol, (45%), a sufficient quantity.

"Moisten the powder with 100 Cc. (or 2 ounces) of the alcohol, and complete the percolation process. The resulting tincture should measure 100 Cc. (or 20 ounces)." < Br. Dose, ½ to 1 fl.drachm.

The above preparation represents 10% of the drug.

This is given as an anodyne and sedative.

TINCTURA IODI. U. S., Br. Tincture of Iodine.

The U. S. P. formula is:

Iodine,	70 Gm. or 540 grains
Potassium Iodide,	50 Gm. or 386 grains
Alcohol, sufficient to make	1000 Cc. or 17 fl.ounces

"Triturate the iodine and potassium iodide rapidly in a mortar to a coarse powder, and transfer it at once to a graduated bottle. Rinse the mortar with several successive portions of alcohol, and pour the rinsings into the bottle. Then add alcohol, shaking occasionally, until the iodine and potassium iodide are dissolved, and the finished tincture measures 1000 Cc. (or 17 fl.ounces)." < U. S.

Average dose.—0.1 Cc. ($1\frac{1}{2}$ minims).

Chiefly used externally.

The Br. P. formula is:

Iodine,	25 Gm. or $\frac{1}{2}$ ounce
Potassium Iodide,	25 Gm. or $\frac{1}{2}$ ounce
Distilled Water,	25 Cc. or $\frac{1}{2}$ fl.ounce
Alcohol, (90%),	a sufficient quantity.

"Place the iodine and potassium iodide in a bottle with the distilled water; when solution has been effected add a sufficient quantity of the alcohol to produce 1000 Cc. (or 20 fl.ounces) of the tincture. Dose, 2 to 5 minims." < Br.

It will be observed that the Br. is quite different from the U. S. preparation. The U. S. tincture is seldom given internally, but is used for outward application as an absorbent, alone or combined with other substances. When given, the dose is 1 to 3 minims, well diluted.

TINCTURA IODI DECOLORATA. B. P. C.

Decolorized Tincture of Iodine.

Iodine 250 grains, alcohol (90%) $5\frac{1}{2}$ ounces. Dissolve by the aid of gentle heat. When cold transfer to a stoppered bottle and add strong solution of ammonia 10 fl.drachms. Keep the mixture in a warm place until decolorized, after which dilute it with alcohol (90%), sufficient to produce 20 fl.ounces.

TINCTURA IPECACUANHÆ. Tincture of Ipecac.

This tincture is official in most of the European pharmacopœias, the general formula being:

Ipecac,	1 part
Diluted Alcohol,	10 parts

Make a tincture by maceration or percolation. The dose is 15 to 30 minims.

TINCTURA IPECACUANHÆ ET OPII. U. S.

Tincture Ipecac and Opium. Tinctura Doveri.

Tincture of Deodorized Opium,	1000 Cc. or 10 fl.ounces
Fluidextract of Ipecac,	100 Cc. or 1 fl.ounce
Diluted Alcohol, to make	1000 Cc. or 10 fl.ounces

The tincture of deodorized opium is to be evaporated in a tared capsule on a water-bath until it weighs 800 Gm. (or 8 ounces av.)+

151 grains). When cold the fluidextract of ipecac is to be added and the mixture filtered, adding enough diluted alcohol through the filter to make the measure 1900 Cc. (or 10 fl.ounces). This represents Dover's powder in liquid form. <U. S.

Average dose.—0.5 Cc. (8 minims).

TINCTURA JABORANDI. Br.

Tincture of Jaborandi. Tincture of Pilocarpus.

Jaborandi Leaves, in No. 40 powder, 200 Gm. or 4 ounces

Alcohol, (45%), a sufficient quantity.

"Moisten the powder with 125 Cc. (or 2½ fl.ounces) of the alcohol and complete the percolation process. The resulting tincture should measure 1000 Cc. (or 20 ounces). Dose, ½ to 1 fl.drachm." <Br.

This makes a 20% tincture.

This may also be made by water-bath percolation as directed for Tincture of Belladonna Leaves.

TINCTURA JALAPÆ. Br. Tincture of Jalap.

Jalap, in No. 40 powder, 200 Gm. or 4 ounces

Alcohol, (70%), a sufficient quantity.

"Moisten the powder with 100 Cc. (or 2 fl.ounces) of the alcohol, pack it in a percolator, gradually add more of the alcohol until the percolate measures 600 Cc. (or 12 fl.ounces); subject the marc to pressure, add the expressed liquid to the percolate and set aside for 24 hours; filter. Determine the amount of jalap resin in 10 Cc. of the resulting strong tincture by the process described under "Jalapæ Resinæ" and dilute the remainder of the strong tincture with a sufficient quantity of the alcohol to produce a tincture containing 1.5 Gm. of the resin in 100 Cc. Dose, ½ to 1 fl.drachm." <Br.

This is used as a purgative.

TINCTURA KINO. U. S., Br. Tincture of Kino.

The U. S. P. formula is:

Kino,	50 Gm. or 1¾ ounces av.
Purified Talc,	10 Gm. or 155 grains
Glycerin,	150 Cc. or 5 fl.ounces
Alcohol,	650 Cc. or 23 fl.ounces
Water, a sufficient quantity	

To make 1000 Cc. or 34 fl.ounces

"Mix the glycerin with 200 Cc. (or 6¾ fl.ounces) of water and triturate the kino and purified talc with sufficient of the mixture to produce a thin smooth magma. Transfer this magma to a flask by the aid of the remainder of the mixture, and, having ascertained the weight of the flask and contents, heat it on a water-bath for about 1 hour;

allow the flask and contents to cool, and restore the original weight by the addition of sufficient water. Then add the alcohol, mix, and pass the tincture through a filter of purified cotton, keeping the funnel well covered. Finally, add sufficient alcohol through the filter to obtain 1000 Cc. (or 34 fl.ounces) of tincture." <U. S.

This is a 5% tincture of kino. It is used chiefly as an astringent in diarrhoea.

Average dose.—4 Cc. (1 fl.drachm).

The Br. P. formula is:

Kino, in powder,	100 Gm. or 2 ounces
Glycerin,	150 Cc. or 3 fl.ounces
Distilled Water,	250 Cc. or 5 fl.ounces
Alcohol, (90%), a sufficient quantity.	

"Mix the glycerin and distilled water, rub the kino in a mortar with a sufficient quantity of the mixture to form a smooth paste, gradually adding the remainder of the mixture, transfer to a closed vessel; add 500 Cc. (or 10 fl.ounces) of the alcohol; set aside for 12 hours, frequently agitating; filter through a plug of cotton wool; pass sufficient of the alcohol through the filter to produce 1000 Cc. (or 20 fl.ounces) of the tincture. Dose, $\frac{1}{2}$ to 1 fl.drachm." <Br.

This is a 10% tincture. Keep the tincture in well-stoppered bottles.

The great trouble with tincture of kino is its tendency to gelatinize. These formulas, if properly followed, are supposed to overcome this difficulty.

TINCTURA KOLÆ. Tincture of Kola.

This tincture is now official in the Fr. and Mex. Pharmacopœias. The formula is:

Kola Nuts, in powder,	100 Gm.
Alcohol, (60%),	500 Gm.

Macerate during 10 days. Express and filter.

Preparations of Kola have come into considerable use of late as a nervous stimulant. It contains the same principles as coffee.

TINCTURA KRAMERIÆ. U. S., Br.

Tincture of Krameria. [Rhatany].

The U. S. formula is:

Krameria, in No. 40 powder,	200 Gm. or 3½ ounces av.
Diluted Alcohol, to make	1000 Cc. or 17 fl.ounces

"Moisten the krameria with 80 Cc. (or 1⅓ fl.ounces) of diluted alcohol, transfer it to a percolator, and, without pressing the powder, allow it to stand, well covered, for 6 hours; then pack it firmly and pour on enough diluted alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice and macerate for 24 hours. Then allow the perco-

lation to proceed slowly, pouring on sufficient diluted alcohol to obtain 1000 Cc. (or 17 fl.ounces) of tincture." <U. S.

This is employed chiefly as an astringent.

Average dose.—4 Cc. (1 fl.drachm).

The Br. P. formula is:

Krameria Root, in No. 40 powder, 200 Gm. or 4 ounces

Alcohol, (90%), a sufficient quantity.

Moisten the powder with 200 Cc. (or 2 ounces) of the alcohol and complete the percolation process. The resulting tincture should measure 1000 Cc. (or 20 fl.ounces). Dose, $\frac{1}{2}$ to 1 fl.drachm. <Br.

This is the same as the U. S. P., representing 20% of the drug.

Made by Water-Bath Percolation.

Take the ingredients as directed in the U. S. formula. Make a tincture by water-bath percolation as directed for Tincture Arnica Root.

The P. G. under the title *Tinctura Rhatanhiæ*, directs krameria 1 part, diluted alcohol 5 parts, the tincture to be made by maceration.

Tincture of Rhatany is an astringent, given in doses of $\frac{1}{2}$ to 2 fl.ounces.

TINCTURA LACTUCARII. U. S. Tincture of Lactucarium.

Lactucarium, 500 Gm. or 8 ounces av.

Glycerin, 250 Cc. or $3\frac{3}{4}$ fl.ounces

Water, Alcohol, Benzin and Diluted Alcohol,
each, a sufficient quantity.

The lactucarium is to be beaten in a mortar with clean sand, to a coarse powder and the mixture put into a bottle. To it 2000 Cc. (or 31 fl.ounces) of purified petroleum benzin are to be added and the mixture agitated frequently during 48 hours. It is then to be poured upon a double filter, allowed to drain and then washed with 1500 Cc. (or 23 fl.ounces) of petroleum benzin, and the lactucarium afterwards dried by exposure to the air. When it is dry and free from the odor of benzin it is to be reduced to a powder, using more sand, if necessary, and the powder packed in a conical percolator. The glycerin is to be mixed with 200 Cc. (or 3 fl.ounces) of water and 500 Cc. (or $7\frac{2}{3}$ fl.ounces) of alcohol, the powder moistened with 500 Cc. (or $7\frac{2}{3}$ fl.ounces) of the mixture, and when the percolate has begun to drop, the lower orifice closed and the contents of the percolator allowed to macerate for 24 hours. Then begin the percolation, allow it to proceed very slowly, adding at first the remainder of the menstruum and then diluted alcohol until the lactucarium is exhausted. The first 750 Cc. (or 12 fl.ounces) of the percolate are to be reserved and the remainder evaporated on a water-bath at a temperature not exceeding 70°C. (158°F.), to 250 Cc. (or $3\frac{1}{3}$ fl.ounces), and mixed with the reserved portion. This is to be filtered after standing and diluted

alcohol added through the filter to make 1000 Cc. (or 15 $\frac{1}{3}$ fl.ounces).
 <U. S. This tincture represents 50% of lactucarium.

Average dose.—2 Cc. (30 minims).

TINCTURA LAVENDULÆ COMPOSITA. U. S., Br.

Compound Tincture of Lavender. Compound Spirit of Lavender.

This preparation, which was formerly classed with Spirits, has been very properly transferred to the Tinctures, but will still be found with the spirits in most pharmacopœias.

Oil of Lavender Flowers,	8 Cc. or 120	minims
Oil of Rosemary,	2 Cc. or 30	minims
Saigon Cinnamon,	20 Gm. or $\frac{3}{4}$	ounce av.
Myristica,	10 Gm. or 154	grains
Cloves,	5 Gm. or 77	grains
Red Saunders,	10 Gm. or 154	grains
Alcohol,		

Water, each a sufficient quantity

To make 1000 Cc. or 34 fl.ounces

“Reduce the dry drugs to a No. 50 powder, and macerate this powder for 3 days in a mixture of 750 Cc. (or 26 fl.ounces) of alcohol and 250 Cc. (or 6 $\frac{1}{2}$ fl.ounces) of water in which liquid the oils have been dissolved. Then filter, and, when the liquid has drained off completely, pass enough of a mixture of alcohol and water, made in the same proportions as before, through the residue on the filter to make 1000 Cc. (or 34 fl.ounces) of tincture.”<U. S.

Average dose.—2 Cc. (30 minims).

The Br. P. formula is:

Oil of Lavender,	4.7 Cc. or 45	minims
Oil of Rosemary,	0.5 Cc. or 5	minims
Cinnamon Bark, bruised,	8.5 Gm. or 75	grains
Nutmeg, bruised,	8.5 Gm. or 75	grains
Red Saunders Wood,	17 Gm. or 150	grains
Alcohol, (90%),	1000 Cc. or 20	fl.ounces

“Prepare by the maceration process, adding the oils at the completion of the process.”<Br. Dose, $\frac{1}{2}$ to 1 fl.drachm.

TINCTURA LIMONIS CORTICIS. U. S. Tincture of Lemon Peel.

Tinctura Limonis. Br. Tincture of Lemon.

The U. S. formula is:

Lemon Peel, from the fresh fruit, in thin shavings and
 cut into narrow shreds, 500 Gm. or 10 ounces av.
 Alcohol, a sufficient quantity

To make 1000 Cc. or 20 fl.ounces

“Macerate the lemon peel in a stoppered, wide-mouthed container, in a moderately warm place, with 1000 Cc. (or 20 fl.ounces) of alco-

hol during 48 hours, with frequent agitation; then filter through purified cotton, and, when the liquid has drained off completely, gradually pour on enough alcohol to make 1000 Cc. (or 20 fl.ounces) of tincture and filter." <U. S.

Used chiefly for flavoring, as "Extract of Lemon."

The Br. P. formula is:

Fresh Lemon Peel, cut small, 250 Gm. or 5 ounces av.

Alcohol, (90%), 1000 Cc. or 20 fl.ounces

Prepare by the maceration process. <Br.

This is used for flavoring and given as an aromatic stimulant in doses of $\frac{1}{2}$ to 1 fl.drachm.

TINCTURA LOBELIÆ. U. S. Tincture of Lobelia.

Lobelia, in No. 40 powder, 100 Gm. or $1\frac{3}{4}$ ounces av.

Diluted Alcohol, to make 1000 Cc. or 17 fl.ounces

"Moisten the lobelia with 40 Cc. (or $1\frac{3}{8}$ fl.ounces) of diluted alcohol, transfer it to a percolator, and, without pressing the powder, allow it to stand, well covered, for 6 hours; then pack it firmly and pour on enough diluted alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator close the lower orifice, and, having closely covered the percolator, macerate for 24 hours. Then allow the percolation to proceed slowly, pouring on sufficient diluted alcohol to obtain 1000 Cc. (or 17 fl.ounces) of tincture." <U. S.

Average dose.—Expectorant, 1 Cc. (15 minims). Emetic, 4 Cc. (1 fl.drachm).

The B. P. C. Form. directs lobelia in No. 40 powder, $2\frac{1}{2}$ ounces, alcohol (60%), a sufficient quantity to make by maceration and percolation 20 fl.ounces. Dose, 10 to 30 minims.

TINCTURA LOBELIÆ ÆTHEREA. Br.

Etherial Tincture of Lobelia.

Lobelia, in No. 40 powder, 200 Gm. or 4 ounces

Spirit of Ether, a sufficient quantity.

"Moisten the powder with 100 Cc. (or 2 ounces) of spirit of ether and complete the percolation process. The resulting tincture should measure 1000 Cc. (or 20 fl.ounces)." <Br. Dose, 5 to 15 minims.

This tincture represents 20% of the drug.

TINCTURA LUPULI. Br. Tincture of Hops.

Hops, 200 Gm. or 4 ounces

Alcohol, (60%), 1000 Cc. or 20 fl.ounces

"Prepare by the maceration process. Dose, $\frac{1}{2}$ to 1 fl.drachm." <Br.

This represents 20% of the drug.

TINCTURA MOSCHI. U. S. Tincture of Musk.

Musk,	5 Gm. or 60 grains
Alcohol,	45 Cc. or 1 fl.ounce
Water,	45 Cc. or 1 fl.ounce
Diluted Alcohol, to make	100 Cc. or 2½ fl.ounces

The musk is to be rubbed in a mortar, first with a little of the water, until a smooth mixture is made, and then with the remainder of the water. The mixture is to be transferred to a bottle, the mortar rinsed with successive portions of the alcohol and added, and allowed to macerate for 7 days, with occasional agitation. It is then to be filtered and enough diluted alcohol added through the filter to make the measure 100 Cc. (or 2½ fl.ounces). <U. S.

Average dose.—4 Cc. (1 fl.drachm).

As good grain musk (which is to be used in this preparation) is worth from \$25.00 to \$35.00 per ounce, it will be advisable to touch this official very lightly.

TINCTURA MYRRHÆ. U. S. Br. Tincture of Myrrh.

The U. S. P. formula is:

Myrrh, in moderately coarse powder,	200 Gm. or 3½ ounces av.
Alcohol, sufficient to make	1000 Cc. or 17 fl.ounces

The powder is to be mixed with 750 Cc. (or 13 fl.ounces) of alcohol in a closed vessel, and macerated for 3 days with occasional shaking, and then filtered, adding enough alcohol through the filter to make the measure 1000 Cc. (or 17 fl.ounces). <U. S.

This tincture represents 20% of the drug.

Average dose.—1 Cc. (15 minims).

The Br. P. formula is:

Myrrh, in coarse powder,	200 Gm. or 4 ounces
Alcohol, (90%), a sufficient quantity.	

“Place the myrrh with 800 Cc. (or 16 fl.ounces) of the alcohol in a closed vessel; set aside for 7 days, with occasional agitation; filter. When the liquid ceases to drop, pass sufficient of the alcohol through the filter to produce 1000 Cc. (or 20 fl.ounces) of the tincture.” <Br.

Dose, ½ to 1 fl.drachm.

TINCTURA NUCIS VOMICÆ. U. S., Br.**Tincture of Nux Vomica.**

The U. S. P. formula is:

Extract of Nux Vomica, containing 5 percent.	
of strychnine,	200 Gm. or 155 grains
Alcohol and Water, each	
sufficient to make	1000 Cc. or 17 fl.ounces

"Dissolve the extract of nux vomica in a sufficient quantity of a mixture of alcohol and water made in the proportion of 750 Cc. (or 3 measures) of alcohol, and 250 Cc. (or 1 measure) of water, to make the solution measure 1000 Cc. (or 17 fl.ounces), and filter through a well covered filter."

"Tincture of Nux Vomica, when assayed by the process given, should contain in 100 Cc. 0.1 Gm. of strychnine." < U. S.

Average dose.—0.6 Cc. (10 minims).

The Br. P. formula is:

Liquid Extract of Nux Vomica,	100 Cc. or 2 fl.ounces
Distilled Water,	150 Cc. or 3 fl.ounces
Alcohol, (90%),	a sufficient quantity.

"Mix the liquid extract of nux vomica with the distilled water; add sufficient of the alcohol to produce 12 fl.ounces (600 Cc.) of the tincture; filter." < Br.

Tested by assay 100 Cc. of this tincture should yield not less than 0.24 or more than 0.26 Gm. of strychnine, corresponding to about $\frac{1}{8}$ grain in 1 fl.drachm, or $\frac{1}{4}$ grain in 110 minims.

TINCTURA OPII. U. S., Br. Tincture of Opium. Laudanum.

The U. S. P. formula is:

Granulated Opium, (containing 12 to 12½ percent. of crystallized morphine),	100 Gm. or 3½ ounces av.
Alcohol,	
Water,	
Diluted Alcohol, each a sufficient quantity	

To make	1000 Cc. or 34 fl.ounces
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"Heat 400 Cc. (or 13½ fl.ounces) of water to boiling, and pour it on the granulated opium contained in a tared vessel, weigh and stir occasionally during 12 hours; then restore the original weight by the addition of cold water, add 400 Cc. (or 13½ fl.ounces) of alcohol, pour the mixture into a bottle and continue the maceration for 48 hours, occasionally shaking. Transfer the mixture to a percolator, return the first portion of the percolate until it runs through clear, and, when the liquid ceases to drop, continue the percolation slowly, pouring on sufficient diluted alcohol until 1000 Cc. (or 34 fl.ounces) are obtained."

"Tincture of Opium, when assayed by the process given, should contain in 100 Cc. not less than 1.2 nor more than 1.25 Gm. of crystallizable morphine." < U. S.

Average dose.—0.5 Cc. (8 minims).

Made by Water-Bath Percolation.

The ingredients used in the U. S. formula are to be employed. Mix the opium with the water previously heated to boiling, and macerate for 12 hours, then, having covered the perforated diaphragm of the

water-bath percolator with coarse cloth, pour the mixture upon it; heat to about 80°C. (176°F.) for 2 hours, then add the alcohol and, after an hour, begin to percolate, adding diluted alcohol to the drug when the liquid has all disappeared from the surface, and continuing the heat and percolation until 2 pints of tincture are obtained. Lastly, after standing a day or two, filter through paper.

If made by water-bath percolation, or if moist opium instead of granulated is used, the assay of the tincture will show the percentage of morphine, and the tincture may be regulated by the addition of diluted alcohol, if necessary, to conform to the pharmacopœial percentage required.

Tincture of opium is given as an anodyne in doses of 10 to 30 minims. It is also used extensively for external application in liniments etc.

The Br. P. formula is:

Opium,	150 Gm. or 3 ounces
Alcohol, (90%),	
Distilled Water, of each a sufficient quantity.	

"Rub the opium to a paste with 10 fl.ounces (or 500 Cc.) of distilled water, previously heated to at least 200°F. (93.3°C.); set aside for 6 hours; add 10 fl.ounces (or 500 Cc.) of the alcohol; mix thoroughly; set aside in a covered vessel for 24 hours; strain; press; mix the liquids; set aside for 24 hours; filter." < Br.

TINCTURA OPII AMMONIATA. Br.

Ammoniated Tincture of Opium.

Tincture of Opium,	150 Cc. or 3 fl.ounces
Benzoic Acid,	20.6 Gm. or 180 grains
Oil of Anise,	6.25 Gm. or 1 fl.drachm
Solution of Ammonia,	200 Cc. or 4 fl.ounces
Alcohol, (90%), a sufficient quantity.	

"Dissolve the oil of anise and the benzoic acid in 12 fl.ounces (or 600 Cc.) of the alcohol; add the tincture of opium and the solution of ammonia; mix well; filter; add enough of the alcohol to form 20 ounces (or 1000 Cc.) of the tincture. Dose, $\frac{1}{2}$ to 1 fl.drachm." < Br.

TINCTURA OPII CAMPHORATA. U. S.

Camphorated Tincture of Opium. Paregoric.

Powdered Opium,	4 Gm. or 60 grains
Benzoic Acid,	4 Gm. or 60 grains
Camphor,	4 Gm. or 60 grains
Oil of Anise,	4 Cc. or 60 minims
Glycerin,	40 Cc. or 1 $\frac{1}{4}$ fl.ounces
Diluted Alcohol, to make	1000 Cc. or 33 fl.ounces

The drugs are to be macerated with 900 Cc. (or 30 fl.ounces) of diluted alcohol for 3 days with frequent shaking. The mixture is then

to be filtered, and enough diluted alcohol added through the filter to make 1000 Cc. (or 33 fl.ounces). <U. S.

Sixty grains of powdered extract of licorice added makes a darker and more desirable color.

The following formula will be found very convenient for making paregoric quickly or extemporaneously.

Rapid Method of Making Paregoric.

Tincture of Opium,	10 fl.drachms
Benzoic Acid,	60 grains
Spirit of Camphor,	10 fl.drachms
Extract of Licorice, powdered,	60 grains
Oil of Anise,	1 fl.drachm
Glycerin,	1 fl.ounce
Diluted Alcohol,	30 fl.ounces

Rub the extract of licorice with the benzoic acid in a mortar and triturate them with separate portions of the diluted alcohol; dissolve the oil of anise in the spirit of camphor and mix with the diluted alcohol etc., add the glycerin, and filter.

TINCTURA OPII DEODORATI. U. S.

Tincture of Deodorized Opium.

Granulated Opium, (containing 12 to 12.5 percent. of crystallizable morphine),	100 Gm. or 3½ ounces av.
Purified Petroleum Benzin,	75 Cc. or 2½ fl.ounces
Alcohol,	200 Cc. or 6¾ fl.ounces
Water, sufficient to make	1000 Cc. or 33½ fl.ounces

Upon the granulated opium pour 500 Cc. (or 17½ fl.ounces) of boiling water, stirring the mixture frequently during 24 hours. It is then to be transferred to a percolator and the first portions that pass returned, until the percolate runs through clear, and when the liquid ceases to drop the percolation continued with water until the opium is exhausted. The percolate is to be concentrated by evaporation on a water-bath until it measures 150 Cc. (or 5 fl.ounces) and, when cooled, shaken vigorously for 10 minutes with 65 Cc. (or 2¼ fl.ounces) of the purified benzin. It is then allowed to stand a few moments and the benzin which rises to the top is to be poured off or separated by a separating funnel, and rejected; the liquid is to be shaken again with the remaining 10 Cc. (or 60 minims) of the benzin, and, having carefully separated this second portion of the benzin, the remainder of the liquid is to be evaporated in a warm place, spontaneously until all odor of benzin has disappeared, removing the last traces by heat of a water-bath. The deodorized liquid thus obtained is to be mixed with 600 Cc. (or 20¼ fl.ounces) of water and filtered through a paper filter;

the alcohol is to be mixed with the filtrate and enough water added through the filter to make 1000 Cc. (or 33¾ fl.ounces) of tincture.

An assay process is directed for this tincture which requires that 100 Cc. should yield not less than 1.2, nor more than 1.25 Gm. of crystallized morphine. The assay process is the same as for tincture of opium.

This tincture contains 10% of opium deprived of its noxious and objectionable properties.

Average dose.—0.5 Cc. (8 minims).

TINCTURA PHOSPHORI COMPOSITUS. B. P. C.

Compound Tincture of Phosphorus.

Phosphorus,	12 grains
Chloroform,	2½ fl.ounces

Place in a stoppered bottle, and apply the heat of a water-bath until dissolved. Then add to the solution:

Absolute Alcohol,	12½ fl.ounces
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Shake well. Each fl.drachm contains 1/10 grain phosphorus. Dose, 3 to 12 minims.

TINCTURA PHYSOSTIGMATIS. U. S.

Tincture of Physostigma. Tincture of Calabar Bean.

Physostigma, in No. 50 powder, (containing 0.15 percent. of ether-soluble alkaloids), 100 Gm. or 1¾ ounces av.

Alcohol, a sufficient quantity

To make 1000 Cc. or 17 fl.ounces

“Moisten the physostigma with 40 Cc. (or ¾ fl.ounce) of alcohol, transfer it to a percolator, and, without pressing the powder, allow it to stand, well covered, for 6 hours; then pack it firmly and pour on enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 24 hours. Then allow the percolation to proceed slowly, pouring on sufficient alcohol to obtain 1000 Cc. (or 17 fl.ounces) of tincture.”

“Tincture of Physostigma, when assayed by the process given, should contain in 100 Cc. 0.014 Gm. of the ether-soluble alkaloids from physostigma.” < U. S.

Average dose.—1 Cc. (15 minims).

Assayed fluidextract of physostigma may be obtained from reliable manufacturers and it may be better for druggists to use this in making the tincture. Mix

Fluidextract Physostigma,	1 fl.ounce
Alcohol,	9 fl.ounces

The B. P. C. Form. directs calabar bean, in No. 40 powder, 4 ounces; alcohol, (90%), a sufficient quantity. Make 20 fl.ounces of tincture by maceration and percolation. Dose, 5 to 15 minims.

Made by Water-Bath Percolation.

Take the ingredients as directed in the U. S. formula and make a tincture by water-bath percolation in the same manner as is directed for making tincture of gelsemium.

This is a narcotic sedative, used for neuralgia etc. The dose is 10 to 30 minims.

TINCTURA PODOPHYLLI. Br. Tincture of Podophyllum.

Podophyllum Resin, 36.5 Gm. or 320 grains
Alcohol, (90%), a sufficient quantity.

"Add the podophyllum resin to 18 fl.ounces (or 900 Cc.) of the alcohol and set aside for 24 hours, occasionally agitating; filter; pass sufficient of the alcohol through the filter to produce 2 ounces (or 1000 Cc.) of the tincture." <Br. Dose, 5 to 10 minims.

TINCTURA PRUNI VIRGINIANÆ. Br.

Tincture of Virginian Prune. [Wild Cherry].

Virginian Prune Bark, (Wild Cherry),
in No. 40 powder, 200 Gm. or 4 ounces
Alcohol, (90%), 625 Cc. or 12½ fl.ounces
Distilled Water, 375 Cc. or 7½ fl.ounces

"Mix the powder with the distilled water, set aside in a covered vessel for 24 hours; add the alcohol and complete the maceration process." <Br. Dose, ½ to 1 fl.drachm.

This should be set aside in a place where the temperature will be 80° to 90°F., as the object is to develop the hydrocyanic acid in the bark.

TINCTURA PULSATILLA. B. P. C. Tincture of Pulsatilla.

Pulsatilla, in No. 40 powder, 2 ounces
Alcohol, (60%), a sufficient quantity.

"Moisten the powder with a suitable quantity of the alcohol and macerate for 24 hours; then pack in a percolator and gradually pour more of the alcohol upon it until 20 fl.ounces of tincture is obtained. Dose, 1 to 5 minims or more." <B. P. C.

TINCTURA PYRETHRI. U. S., Br.

Tincture of Pyrethrum. [Pellitory].

The U. S. formula is:

Pyrethrum, in No. 40 powder, 200 Gm. or 3½ ounces av.
Alcohol, to make 1000 Cc. or 17 fl.ounces

The powder is to be moistened with 80 Cc. (or 1½ fl.ounces) of alcohol, and macerated for 6 hours; then packed firmly in a percolator and alcohol gradually poured upon it until 1000 Cc. (or 17 fl.ounces) of tincture are obtained. <U. S.

Used externally as a counter-irritant and as a remedy for toothache.

Made by Water-Bath Percolation.

Take the ingredients directed in the U. S. formula, make a tincture by water-bath percolation in the same manner as is directed for making tincture *cimicifuga*.

The Br. P. formula is:

Pyrethrum Root, in No. 40 powder, 200 Gm. or 4 ounces

Alcohol, (70%), a sufficient quantity.

"Moisten the powder with 3 fl.ounces (or 150 Cc.) of the alcohol, and complete the percolation process. The resulting tincture should measure 20 ounces (or 1000 Cc.)." < Br.

TINCTURA QUASSIÆ. U. S., Br. Tincture of Quassia.

Quassia, in No. 50 powder, 200 Gm. or 7 ounces av.

Alcohol,

Water, each, a sufficient quantity

To make 1000 Cc. or 34 fl.ounces

"Mix $3\frac{1}{2}$ measures of alcohol with $6\frac{1}{2}$ measures of water as a menstruum. Moisten the quassia with 60 Cc. (or 2 fl.ounces) of the menstruum, transfer it to a percolator, and, without pressing the powder, allow it to stand, well covered, for 6 hours; then pack it firmly and pour on enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator close the lower orifice, and, having closely covered the percolator, macerate for 24 hours. Then allow the percolation to proceed slowly, pouring on sufficient menstruum to obtain 1000 Cc. (or 34 fl.ounces) of tincture." < U. S.

Average dose.—2 Cc. (30 minims).

Made by Water-Bath Percolation.

Take the ingredients as directed in the U. S. formula, make a tincture by water-bath percolation as directed for making tincture *arnica* root.

The Br. P. formula is:

Quassia Wood, rasped, 100 Gm. or 2 ounces

Alcohol, (45%), 1000 Cc. or 20 ounces

Prepare by the maceration process. Dose, $\frac{1}{2}$ to 1 fl.drachm. < Br.

Tincture of quassia is a bitter stomachic, the dose of the U. S. being from 15 to 60 minims.

TINCTURA QUEBRACHO. Tincture of Quebracho.

This is official in some foreign pharmacopœias.

Quebracho Bark, in powder, 20 Gm.

Alcohol, (60%), 100 Gm.

Macerate and percolate to produce 100 Gm. of the tincture,

TINCTURA QUILLAJÆ. U. S. Tincture of Quillaja. [Soap Bark].**Tincture Quillaia.** Br. Tincture of Quillaia.

The U. S. formula is:

Quillaja, coarsely ground,	200 Gm. or 7 ounces av.
Alcohol,	350 Cc. or 12 fl.ounces
Water, sufficient to make	1000 Cc. or 34 fl.ounces

The quillaja is to be boiled in a suitable vessel with 800 Cc. (or 27 fl.ounces) of water for 15 minutes, then strained and the residue on the strainer washed with 100 Cc. (or 3½ fl.ounces) of water, and mixed with the strained liquid. This is then to be boiled down to 600 Cc. (or 20 fl.ounces), allowed to cool, mixed with the alcohol, and when the insoluble matter has subsided, the liquid portion filtered and enough water added through the filter to make 1000 Cc. (or 34 fl.ounces) of the tincture. <U. S.

This is used in making some emulsions and as a soda foam. It is also flavored and used as a tooth wash etc.

The Br. P. formula is:

Quillaia Bark, in No. 20 powder,	50 Gm. or 1 ounce
Alcohol, (60%), a sufficient quantity.	

"Moisten the powder with 25 Cc. (or ½ fl.ounce) of the alcohol and complete the percolation process. The resulting tincture should measure 1000 Cc. (or 20 ounces)." <Br.

Dose, ½ to 1 fl.drachm. (Seldom used in medicine).

TINCTURA QUININÆ. Br. Tincture of Quinine.

Quinine Hydrochloride,	20 Gm. or 175 grains
Tincture of Orange,	1000 Cc. or 20 fl.ounces

Dissolve the quinine hydrochloride in the tincture of orange. <Br.
A fl.drachm contains about 1¼ grain of quinine. Dose, ½ to 1 fl.drachm.

TINCTURA QUININÆ AMMONIATA. Br.**Ammoniated Tincture of Quinine.**

Quinine Sulphate,	20 Gm. or 175 grains
Solution of Ammonia,	100 Cc. or 2 fl.ounces
Alcohol, (60%),	900 Cc. or 18 fl.ounces

Mix the solution of ammonia with the alcohol; add the quinine sulphate; shake until a clear solution is produced; set aside for 3 days; filter. A fl.drachm contains about 1¼ grain of quinine. Dose, ½ to 1 fl.drachm.

TINCTURA RHATANIÆ. Tincture of Rhatany.**Tincture of Krameria.**

This tincture is official under the above title in most pharmacopœias, but in the U. S. and Br. it is known as Tinctura Krameria, which see.

The P. G. formula is:

Rhatany Root, in powder,	1 part
Diluted Alcohol,	5 parts

Making a 20% tincture which is the same as the U. S., Br., and other authorities.

TINCTURA RHEI. U. S. Tincture of Rhubarb.

Rhubarb,	200 Gm. or 7 ounces av.
Cardamom,	40 Gm. or 620 grains
Glycerin,	100 Cc. or 3⅓ fl.ounces
Alcohol,	

Water, each, a sufficient quantity

To make 1000 Cc. or 34 fl.ounces

The rhubarb and cardamom are to be reduced to a moderately coarse (No. 40) powder. The glycerin is to be mixed with 500 Cc. (or 17 fl.ounces) of alcohol, and 400 Cc. (or 13½ fl.ounces) of water. The powder is to be moistened with 90 Cc. (or 3 fl.ounces) of the liquid, macerated for 12 hours, packed moderately in a percolator and the remainder of the menstruum gradually poured upon it. When the liquid has disappeared, alcohol and water in the same proportions as above are to be mixed and the percolation continued with the mixture until 1000 Cc. (or 34 fl.ounces) of tincture are obtained. <U. S.

Tincture of rhubarb is given as a stomachic in doses of 1 to 2 fl.drachms, and as a purgative in doses of ½ to 1 fl.ounce.

TINCTURA RHEI AROMATICA. U. S.

Aromatic Tincture of Rhubarb. Spiced Tincture of Rhubarb.

Rhubarb,	200 Gm. or 7 ounces av.
Cassia Cinnamon,	40 Gm. or 1⅓ ounce av.
Cloves,	40 Gm. or 1⅓ ounce av.
Nutmeg,	40 Gm. or 1⅓ ounce av.
Glycerin,	100 Cc. or 3⅓ fl.ounces
Alcohol,	

Water, each, sufficient to make 1000 Cc. or 34 fl.ounces

The rhubarb and spices are to be mixed and reduced to a moderately coarse (No. 40) powder. The glycerin is to be mixed with 500 Cc. (or 17 fl.ounces) of alcohol and 400 Cc. (or 13½ fl.ounces) of water. The powder is to be moistened with 90 Cc. (or 3 fl.ounces) of the liquid, macerated for 12 hours; then packed moderately in a percolator and the remainder of the menstruum gradually poured upon it, macerated 24 hours, then percolated slowly, adding enough alcohol and water mixed in the same proportion as before to make 1000 Cc. (or 34 fl.ounces) of the tincture. <U. S.

Average dose.—2 Cc. (30 minims).

Made by Water-Bath Percolation.

From the same ingredients as directed make a tincture by water-bath percolation in the same manner as directed for making tincture aurantii amari.

This is given for diarrhœa of children especially, acting first as a purgative, then as an astringent. The dose is a teaspoonful to a tablespoonful.

TINCTURA RHEI COMPOSITA. Br.

Compound Tincture of Rhubarb.

Rhubarb Root, in No. 20 powder,	100 Gm. or 2 ounces
Cardamom Seeds, bruised,	12.5 Gm. or $\frac{1}{4}$ ounce
Coriander Fruit, bruised,	12.5 Gm. or $\frac{1}{4}$ ounce
Glycerin,	100 Cc. or 2 fl.ounces
Alcohol, (60%), a sufficient quantity.	

"Moisten the solid ingredients with 2 fl.ounces (or 100 Cc.) of the alcohol; proceed with the percolation process until a volume of 18 fl.ounces (or 900 Cc.) of liquid has been obtained; agitate; set aside for 48 hours; filter; mix with the glycerin. Dose, $\frac{1}{2}$ to 1 fl.drachm for repeated administration. For a single administration 2 to 4 fl.drachms." < Br.

TINCTURA SANGUINARIÆ. U. S.

Tincture of Sanguinaria. Tincture of Bloodroot.

Sanguinaria, in No. 60 powder,	100 Gm. or $1\frac{3}{4}$ ounces av.
Acetic Acid,	20 Cc. or 155 minims
Alcohol,	

Water, each, sufficient to make 1000 Cc. or 17 fl.ounces

Mix alcohol 3 measures with water 2 measures as a menstruum, and, having moistened the sanguinaria with the acetic acid mixed with 30 Cc. (or $\frac{1}{2}$ fl.ounce) of the menstruum, macerate for 6 hours, then pack firmly in the percolator and pour on enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop close the lower orifice, and, having closely covered the percolator, macerate for 24 hours. Then allow the percolation to proceed slowly, pouring on sufficient menstruum to obtain 1000 Cc. (or 17 fl.ounces) of tincture. < U. S.

Average dose.—1 Cc. (15 minims).

Made by Water-Bath Percolation.

Take the ingredients directed in the U. S. formula and mix the alcohol and water, moisten the powder with 4 ounces of the mixture and macerate for 24 hours in a closed vessel, transfer it to the water-bath percolator, pack firmly, pour upon it the remainder of the menstruum and set in a warm place for 2 days, then heat moderately and, after 1 hour, begin to percolate; when the liquid has all disappeared

from the surface of the drug, add sufficient diluted alcohol through the percolator to make the tincture measure 2 pints. Lastly, after standing a few days, filter through paper.

This is given as a stimulating expectorant and tonic in doses of 10 to 30 minims.

TINCTURA SAPONIS. Tincture of Soap.

Several pharmacopœias have formulas for Tincture of Soap. The following are representative formulas:

Teinture de Savon. Fr. Alcoolé de Savon. Medicinal Soap, (Castile), rasped and dried, 100 Gm.; alcohol, (60%), 500 Cc. Macerate with frequent agitation until dissolved and filter.

Tinctura Saponis Viridis. Tincture of Green Soap. This was official in the U. S. P., 1880, but was dismissed from the 1890 revision: Green soap 65 parts, oil of lavender 2 parts, alcohol sufficient to make 100 parts. Mix and macerate until the soap is dissolved and filter.

Tintura de Jabón Alcanforada. Mex., Sp. This is the same as Balsam Opodeldoc Liquid, which see. The formula is: Soap 60 Gm., alcohol (80%), 2000 Gm., camphor 60 Gm., volatile oil of rosemary 15 Gm., volatile oil of thyme 15 Gm., ammonia water (20%), 60 Gm. Dissolve the soap on a water-bath and mix.

TINCTURA SCILLÆ. U. S., Br. Tincture of Squill.

Squill, in No. 20 powder, 100 Gm. or 1¾ ounces av.
Alcohol,

Water, each, sufficient to make 1000 Cc. or 17 fl.ounces

Alcohol 3 measures with water 1 measure are to be mixed as a menstruum. The powder is to be macerated with 600 Cc. (or 10 fl.ounces) of the liquid and macerated for 3 days, then expressed and the operation repeated with 300 Cc. (or 5 fl.ounces) of the menstruum, macerating for 1 day, then expressing, and the marc again macerated for 6 hours with enough menstruum when expressed and mixed with the liquids previously expressed to make when filtered 1000 Cc. (or 17 fl.ounces) of tincture.

Average dose.—1 Cc. (15 minims).

The Br. P. formula is:

Squill, bruised, 200 Gm. or 4 ounces

Alcohol, (60%), 1000 Cc. or 20 fl.ounces

Prepare by the maceration process. Dose, 5 to 15 minims. <Br.

TINCTURA SENEGÆ. Br. Tincture of Senega.

Senega Root, in No. 40 powder, 200 Gm. or 4 ounces

Alcohol, (60%), a sufficient quantity.

Moisten the powder with 4 fl.ounces (or 200 Cc.) of the alcohol, and complete the percolation process. The resulting tincture should measure 20 ounces (or 1000 Cc.). Dose, $\frac{1}{2}$ to 1 fl.drachm. <Br.

This is a tonic expectorant. Used for coughs and colds.

TINCTURA SENNÆ COMPOSITA. Br.

Compound Tincture of Senna.

Senna, broken small,	200 Gm. or 4	ounces
Raisins of commerce, freed from seeds,	100 Gm. or 2	ounces
Caraway Fruit, bruised,	25 Gm. or $\frac{1}{2}$	ounce
Coriander Fruit, bruised,	25 Gm. or $\frac{1}{2}$	ounce
Alcohol, (45%),	1000 Cc. or 20	ounces

Prepare by the maceration process. Dose, $\frac{1}{2}$ to 1 fl.drachm for repeated administration; for a single administration 2 to 4 fl.drachms. <Br.

This may also be made by water-bath percolation in the same manner as is directed for tincture belladonna.

This preparation was formerly known as "Elixir Salutis." It is an excellent laxative in doses of a tablespoonful or more.

TINCTURA SERPENTARIÆ. U. S. Tincture of Serpentaria.

Tinctura Serpentariæ. Br. Tincture of Serpentary.

The U. S. P. formula is:

Serpentaria, in No. 40 powder, 200 Gm. or $3\frac{1}{2}$ ounces av.
Alcohol,

Water, each, sufficient to make 1000 Cc. or 17 fl.ounces

Alcohol $6\frac{1}{2}$ measures with water $3\frac{1}{2}$ measures are to be mixed as a menstruum. The powder is to be moistened with 60 Cc. (or 1 fl.ounce) of the menstruum and macerated for 6 hours, then packed firmly in a percolator, menstruum poured upon it, macerated for 24 hours, then percolated, adding menstruum until 1000 Cc. (or 17 fl.ounces of tincture are obtained. <U. S.

Average dose.—4 Cc. (1 fl.drachm).

Made by Water-Bath Percolation.

With the same ingredients make a tincture by water-bath percolation as directed for making tincture of arnica root.

The dose is $\frac{1}{2}$ to 1 fl.drachm as a stimulant and diaphoretic.

The Br. P. directs:

Serpentary Rhizome, No. 40 powder, 200 Gm. or 4 ounces

Alcohol, (45%), a sufficient quantity.

Moisten the powder with 4 fl.ounces (or 200 Cc.) of the alcohol, and complete the percolation process. The resulting tincture should measure 20 ounces (or 1000 Cc.). Dose, 5 to 15 minims. <Br.

TINCTURA SIMULO. Capparis Coriacea.

Simulo Seeds, in fine powder,	2 ounces
Alcohol,	12 fl.ounces
Water, sufficient to make	16 fl.ounces

Mix the alcohol with 6 fl.ounces of water and macerate the powder with the liquid for 7 days, then pour upon a filter and add enough water through the filter to make the tincture measure 16 fl.ounces.

This is employed as a nervine for hysteria, epilepsy, nervousness etc. The dose is $\frac{1}{2}$ to 1 fl.drachm.

TINCTURA STRAMONII. U. S., Br. Tincture of Stramonium.

The U. S. P. formula is:

Stramonium, in No. 60 powder, (containing not less than 0.35 percent. of mydriatic alkaloids),	100 Gm. or 13 $\frac{1}{4}$ ounces av.
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Diluted Alcohol, a sufficient quantity

To make 1000 Cc. or 17 fl.ounces

"Moisten the stramonium with 40 Cc. (or $\frac{3}{4}$ fl.ounce) of diluted alcohol, transfer it to a percolator, and, without pressing the powder, allow it to stand, well covered, for 6 hours; then pack it firmly and pour on enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 24 hours. Then allow the percolation to proceed slowly, gradually pouring on diluted alcohol until 1000 Cc. (or 17 fl.ounces) are obtained."

"Tincture of Stramonium, when assayed by the process given, should contain in 100 Cc. 0.03 Gm. of mydriatic alkaloids from stramonium." < U. S.

Average dose.—0.5 Cc. (8 minims).

Assayed fluidextract of stramonium may be obtained from reliable manufacturers, and it is probably better for most retail druggists to prepare this tincture by mixing:

Fluidextract of Stramonium,	1 fl.ounce
Diluted Alcohol,	9 fl.ounces

The Br. P. formula is:

Stramonium Leaves, in No. 20 powder, 200 Gm. or 4 ounces
Alcohol, (45%), a sufficient quantity.

Moisten the powder with 4 fl.ounces (or 200 Cc.) of the alcohol, and complete the percolation process. The resulting tincture should measure 20 ounces (or 1000 Cc.). Dose, 5 to 15 minims. < Br.

It will be noted that the Br. tincture of stramonium is double the strength of the U. S.

TINCTURA STROPHANTHI. U. S., Br.**Tincture of Strophanthus.**

The U. S. P. formula is:

Strophanthus, in No. 60 powder, 100 Gm. or 1¾ ounces av.

Alcohol,

Water, each, sufficient to make 1000 Cc. or 17 fl.ounces

“Mix 6½ measures of alcohol with 3½ measures of water as a menstruum. Moisten the strophanthus with 50 Cc. (or 1 fl.ounce) of menstruum, transfer it to a percolator, and, without pressing the powder, allow it to stand, well covered, for 6 hours; then pack it firmly and pour on enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop close the lower orifice, and, having covered the percolator closely, macerate for 48 hours. Then allow the percolation to proceed slowly, pouring on enough of the menstruum to obtain 1000 Cc. (or 17 fl.ounces) of tincture.” <U. S.

The Br. P. formula is:

Strophanthus Seeds, No. 30 powder, 25 Gm. or ½ ounce

Alcohol, (70%), a sufficient quantity.

“Pack the powder in a percolator, moisten it with 1 fl.drachm (or 6 Cc.) of the alcohol; set aside for 48 hours; pour on successive quantities of the alcohol, allowing the percolation to proceed slowly, until a total volume of 10 fl.ounce (or 500 Cc.) of percolate have been obtained; filter; add a sufficient quantity of the alcohol to produce 20 ounces (or 1000 Cc.) of the tincture. Dose, 5 to 15 minims.” <Br.

The great difference in the strength of this tincture as prepared by the different pharmacopœias should be noted.

The U. S. tincture is 10%, the Br. is 2½%, both made with about 70% alcohol.

TINCTURA STRYCHNI. P. G.**Tincture of Nux Vomica. Brechnusstinktur.**

This is official under this title in several of the European pharmacopœias. (See Tincture Nux Vomica).

The P. G. formula directs:

Nux Vomica, in powder,

1 part

Diluted Alcohol,

10 parts

Make a tincture by maceration. This is then to be assayed as directed. Dose, 1 Gm. (or 15 drops), 2 Gm. (or 30 drops), daily.

TINCTURA STRYCHNI MALACCENSIS.**Tincture of Hoang Nan.**

Hoang Nan Bark, in powder,

4 ounces

Acetic Acid,

1 fl.ounce

Alcohol, sufficient to make

16 fl.ounces

Moisten the powder with the acetic acid mixed with sufficient alcohol and pack in a percolator. Pour upon it alcohol sufficient to cover it well and allow to stand for 24 hours, then percolate with alcohol until 16 fl.ounces have passed.

This tincture is employed with much success in the treatment of paralysis and for leprosy, syphilis etc. Dose, 3 to 10 minims.

TINCTURA SUMBUL. Br. Tincture of Sumbul.

Sumbul Root, bruised, 100 Gm. or 2 ounces
Alcohol, (70%), 1000 Cc. or 20 ounces

Prepare by the maceration process. This is used as a nervine in doses of 10 to 30 minims. <Br.

TINCTURA TOLUTANA. U. S., Br. Tincture of Tolu.

The U. S. P. formula is:

Balsam of Tolu, 200 Gm. or 3½ ounces av.
Alcohol, to make 1000 Cc. or 17 fl.ounces

The balsam of tolu is to be macerated with 900 Cc. (or 16 fl.ounces) of alcohol until it is dissolved, then filtered through paper and enough alcohol added through the filter to make the tincture measure 1000 Cc. (or 17 fl.ounces). <U. S.

Average dose.—2 Cc. (30 minims).

The Br. P. formula is:

Balsam of Tolu, 100 Gm. or 2 ounces
Alcohol, (90%) a sufficient quantity.

"Place the balsam of tolu in 16 fl.ounces (or 800 Cc.) of the alcohol; set aside in a closed vessel; agitate occasionally; when the balsam is dissolved, filter; pass sufficient of the alcohol through the filter to produce 20 ounces (or 1000 Cc.) of the tincture. Dose, ½ to 1 fl.drachm." <Br.

The U. S. tincture of tolu is 20% and the Br. 10%.

This tincture may be quickly made by the aid of heat. The balsam and alcohol may be put together in a bottle and macerated in a water-bath until the balsam is dissolved. The dose is from 20 to 40 minims.

TINCTURA VALERIANÆ. U. S. Tincture of Valerian.

Valerian, in No. 60 powder, 200 Gm. or 3½ ounces av.
Alcohol,

Water, each, sufficient to make 1000 Cc. or 17 fl.ounces

"Mix 3 measures of alcohol with 1 measure of water as a menstruum. Moisten the valerian with 60 Cc. (or 1 fl.ounce) of this menstruum, transfer it to a percolator, and, without pressing the powder, allow it to stand, well covered, for 6 hours; then pack it firmly and pour on enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator close the lower

orifice, and, having closely covered the percolator, macerate for 24 hours. Then allow the percolation to proceed slowly, pouring on sufficient menstruum to obtain 1000 Cc. (or 17 fl.ounces). "<U. S.

Average dose.—4 Cc. (1 fl.drachm).

Made by Water-Bath Percolation.

Take the ingredients directed in the U. S. formula, mix the alcohol and water as above and make a tincture by water-bath percolation in the same manner as is directed for making tincture of calumba.

The B. P. C. Form., 1901, directs: Valerian rhizome, in No. 40 powder, 2½ ounces; alcohol, (60%), a sufficient quantity. Make 20 fl.ounces of tincture by maceration and percolation.

TINCTURA VALERIANÆ ÆTHEREA. P. G.

Etherial Tincture of Valerian.

Valerian,	1 part
Spirit of Ether,	5 parts

Prepare a tincture by maceration. The dose is 20 to 60 minims.

TINCTURA VALERIANÆ AMMONIATA. U. S., Br.

Ammoniated Tincture of Valerian.

The U. S. P. formula is:

Valerian, in No. 60 powder,	200 Gm. or 3½ ounces av.
Aromatic Spirit of Ammonia,	
sufficient to make	1000 Cc. or 17 fl.ounces

"Moisten the valerian with 60 Cc. (or 1 fl.ounce) of aromatic spirit of ammonia, transfer it to a percolator, and, without pressing the powder, allow it to stand, well covered, for 6 hours; then pack it firmly and pour on enough aromatic spirit of ammonia to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 24 hours. Then allow the percolation to proceed slowly, pouring on sufficient aromatic spirit of ammonia to obtain 1000 Cc. (or 17 fl.ounces) of tincture." <U. S.

Average dose.—2 Cc. (30 minims).

The Br. P. formula is:

Valerian Rhizome, in No. 40 powder,	200 Gm. or 4 ounces
Oil of Nutmeg,	3.1 Cc. or 30 minims
Oil of Lemon,	2.1 Cc. or 20 minims
Solution of Ammonia,	100 Cc. or 2 fl.ounces
Alcohol, (60%),	900 Cc. or 18 fl.ounces

Mix the liquid ingredients and prepare by the maceration process. <Br.

This is used as a stimulant and nervine, the dose being from ½ to 1 fl.drachm.

TINCTURA VANILLÆ. U. S. Tincture of Vanilla.

Vanilla, cut in small pieces and bruised,

100 Gm. or 3½ ounces av.

Sugar, in coarse powder,

200 Gm. or 7 ounces av.

Alcohol,

Water, each, sufficient to make 1000 Cc. or 34 fl.ounces

Alcohol 6½ measures with water 3½ measures are to be mixed as a menstruum. The vanilla is to be macerated in 500 Cc. (or 17 fl.ounces) of the mixture for 12 hours and the liquor then drained off and set aside. The vanilla is then to be put in a mortar with the sugar and beaten to a uniform powder, then packed in a percolator, the reserved liquid poured upon it, and after it has disappeared from the surface menstruum is to be gradually poured on it until 1000 Cc. (or 34 fl.ounces) of tincture have passed. <U. S.

In making this preparation it is necessary to have the vanilla cut fine, which can best be done by chopping it in a chopping bowl. It should also be well drained before beating in a mortar with the sugar in order that a uniform powder may be obtained. This or other similar preparations which may be stronger or weaker, are considerably sold as "Extract of Vanilla."

Made by Water-Bath Percolation.

Take the ingredients as directed in the U. S. formula preceding. Mix alcohol and water in the proportions designated, moisten the vanilla with 3 ounces of the mixture and macerate in a closed vessel for 24 hours, transfer it to a mortar and beat it thoroughly with the sugar until it is reduced to a coarse powder, pack this very firmly in the water-bath percolator, pour upon it about a pint and a half of the menstruum and set in a warm place for 2 days, then heat very moderately and, after 1 hour, begin to percolate, adding the menstruum to the drug and continuing the heat and percolation until 34 ounces of tincture are obtained. Lastly, after a few days, filter through paper.

This tincture may be used as a flavoring extract but is stronger than is usually sold for that purpose. Formulæ for flavoring extracts of vanilla will be found among Flavoring Extracts.

TINCTURA VERATRI. U. S. Tincture of Veratrum.

Tincture of Veratrum Viride.

[Tinctura Veratri Viridi, Pharm. 1890].

Veratrum, in No. 60 powder, 100 Gm. or 3½ ounces av.

Alcohol, sufficient to make 1000 Cc. or 34 fl.ounces

The powder is to be moistened with 40 Cc. (or 1⅓ fl.ounces) of alcohol and macerated for 6 hours. It is then to be packed firmly in a percolator and alcohol poured upon it sufficient to saturate the powder and leave a stratum above it. Then allow it to percolate very slowly.

until 1000 Cc. (or 34 fl.ounces) of the tincture are obtained. <U. S.

The B. P. C. Form., 1901, directs: Green hellebore rhizome, in No. 40 powder, 4 ounces; alcohol, (90%), a sufficient quantity. Make 20 fl.ounces of tincture by maceration and percolation. Dose, 5 to 15 minims. This is a 20% tincture.

Made by Water-Bath Percolation.

Take the ingredients as directed in the U. S. formula and make a tincture by water-bath percolation in the same manner as directed for making tincture of aconite root.

Tincture of veratrum is used as an arterial sedative in fevers, delirium etc.

Norwood's Tincture of Veratrum Viride is made from the green root of the American Hellebore and is probably superior to any preparation made from the dried root. This tincture may be prepared from the green root in the same way as is directed for making tincturæ Herbarium Recentium, which see.

TINCTURA YERBA SANTA AROMATICA, SOLUBILIS.

The following formula is very convenient for making elixir or syrup of yerba santa extemporaneously:

Ground Yerba Santa,	4	ounces
Oil of Cloves,	60	drops
Oil of Cinnamon,	60	drops
Liquor Potassa,	1½	ounces
Glycerin,	5	ounces
Aqua,	10	ounces
Alcohol,	6	ounces

Rub the oils with the yerba santa, then moisten the drug with 1 part of glycerin, 2 parts of water, place in the percolator and add the balance of the glycerin and water to which ¾ ounce of liquor potassa has been added. Allow to macerate 12 hours, then allow percolation to proceed, adding water until 10 ounces are received, then add to the percolate ¾ ounce liquor potassa and 6 ounces of alcohol and filter. The addition of 1 drachm of cochineal to the drug gives the product a brighter color.

This will stand indefinitely and mixes clear with syrup and water and when mixed 3 parts of simple elixir or syrup with 1 part of the tincture, gives a nice elixir or syrup as the case may be.

TINCTURA ZINGIBERIS. U. S., Br. Tincture of Ginger.

Ginger, in No. 50 powder,	200 Gm. or 7 ounces av.
Alcohol, sufficient to make	1000 Cc. or 34 fl.ounces

"Moisten the ginger with 60 Cc. (or 2 fl.ounces) of alcohol, transfer it to a percolator, and, without pressing the powder, allow it to stand,

well covered, for 6 hours; then pack it firmly and pour on enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 24 hours. Then allow the percolation to proceed slowly, pouring on sufficient alcohol to obtain 1000 Cc. (or 34 fl.ounces).” <U. S.

Average dose.—2 Cc. (30 minims).

Made by Water-Bath Percolation.

Take the ingredients directed in the U. S. formula and moisten the ginger with 4 ounces of alcohol, pack firmly in the water-bath percolator, pour upon it a pint and a half of alcohol and set in a warm place for 2 days, then heat very moderately and, after 1 hour, begin to percolate slowly, adding alcohol to the drug and continuing the heat and percolation until 34 fl.ounces of tincture are obtained.

The alcohol remaining in the drug after percolation may be recovered by distillation.

The Br. P. formula is:

Ginger, in No. 40 powder, 100 Gm. or 2 ounces

Alcohol, (90%), a sufficient quantity.

Moisten the powder with 100 Cc. (or 2 fl.ounces) of the alcohol, and complete the percolation process. The resulting tincture should measure 1000 Cc. (or 20 fl.ounces). Dose, $\frac{1}{2}$ to 1 fl.drachm. <Br.

Tincture of ginger is a warm stimulant and is considerably used in medicine and as a flavoring.

TINCTURA ZINGIBERIS FORTIOR. B. P. C.

Stronger Tincture of Ginger. Essence of Ginger.

Ginger, in fine powder, 10 ounces

Alcohol, (90%), a sufficient quantity.

Make 20 fl.ounces of tincture by maceration and percolation.

The foregoing formulas represent all the tinctures of the U. S. and Br. Pharmacopœias. The use of tinctures in this country has greatly decreased during the past twenty years, their place being largely supplied by fluidextracts, elixirs and other more convenient or palatable forms of medicine. Many of the tinctures that are but little used are not now kept by druggists, but are prepared from fluidextracts as required for present use, when wanted. If other tinctures than those for which formulas are given in this work are needed, they may, as a rule, be made from fluidextracts, the manufacturer's label on the fluidextract bottle generally giving the formula.

TINCTURÆ HERBARIUM RECENTIUM. U. S.

Tinctures of Fresh Herbs.

“Tinctures of Fresh Herbs when not otherwise directed are to be prepared according to the following formula:” <U. S.

The fresh herb, bruised or crushed,

500 Gm. or $16\frac{2}{3}$ ounces av.

Alcohol,

1000 Cc. or 32 fl.ounces

The herb is to be macerated with the alcohol in a closed vessel in a moderately warm place for 14 days, then strongly expressed and the liquid filtered.

Made by Water-Bath Percolation.

Tinctures of fresh herbs, flowers, barks, leaves, roots etc., may be made by water-bath percolation by the following:

General Formula for Tinctures from Fresh Herbs etc.

The Fresh Herb, Bark, Leaf, Flower or Root, 16 ounces av.

Alcohol, sufficient to make

2 pints

Bruise, cut, grate, or otherwise reduce the substance to the proper condition for exhaustion and pack it in the water-bath percolator; pour upon it a pint of alcohol and set in a warm place for 2 days; then heat moderately, and, after 1 hour, begin to percolate, adding alcohol to the drug and continuing the heat and percolation until a pint and a half has passed; remove the drug from the percolator, express, and if the expressed liquid measures more than half a pint, evaporate it to that measure and add to the percolate; but if it measures less than half a pint, make up to that measure with alcohol and add to the percolate. Lastly, after standing for a few days, filter through paper.

The so-called "Green Tinctures," "Saturated Tinctures," "Specific Tinctures" etc., may be made in this manner. A great variety of tinctures may be prepared from green plants in this manner.

Alcoolatures of French Pharmacy are similar to, but double the medicinal strength of the U. S. Tinctures of Fresh Herbs, and they also include preparations of leaves, flowers, peel, roots and bulbs.

The French Codex formula for Alcoolatures is:

The fresh part of the plant directed,

1000 Gm.

Alcohol,

1000 Gm.

Crush, bruise, cut or otherwise prepare the substances directed and macerate with the alcohol during 10 days, with frequent stirring; then strain, press out and filter the liquid.

The so-called "Green Plant Fluidextracts" are prepared in this manner.

UNOFFICIAL TINCTURES.

The foregoing tinctures are those official in the U. S. and Br. Pharmacopœias; besides these are many other tinctures which are or have been popular, and which are more or less called for, the principal ones being made 10%, 15% or 20% of the drug, with a suitable menstruum, in the same manner as the official tinctures. If druggists have fluidextracts of the drugs the label generally states the quantity of the fluidextract and the menstruum required to make a specified

quantity of the tincture. By following the formula almost any simple tincture can be satisfactorily made and at less expense and trouble than if made from the drug direct.

TISANES.

In French pharmacy Tisanes are slightly-medicated infusions of some aromatic substance combined with barley, rice or tamarind water, or other mucilaginous vehicle, the dose being a wineglassful or more every half hour until the medicinal effect is obtained. A great number of formulas are given for them in the Fr. Codex, about two-thirds being 10 parts of the drug in 1000; nearly one-third being 5 parts of the drug in 1000; and the remainder being from 2 to 5 percent., or 20 to 50 parts of the drug in 1000 parts of the tisane. As they are seldom used in this country, and as the more important ones are represented under infusions, the formulas are not here repeated.

TRITURATIONES — TRITURATIONS.

Triturations in pharmacy, are preparations consisting of some active medicinal agent, reduced by rubbing, or divided intimately in a mortar with nine times its weight of sugar of milk or some other inert diluent. But one formula, besides the general formula for making them is given in the U. S. P.; any substance, however, may be made up in the form of a triturate if desired, and this is a very good way to exhibit medicines of which a very small dose only is required, as the medicinal agent is finely divided and the dose can be properly regulated. The following is the U. S. P.

General Formula for Triturations.

The Substance,	10 Gm. or 10 parts
Sugar of Milk, moderately fine powder,	90 Gm. or 90 parts
To make	100 Gm. or 100 parts

Weigh the substance and sugar of milk separately, then place the substance, previously reduced, if necessary, to a moderately fine powder, in a mortar, add about an equal bulk of sugar of milk, mix well by means of a spatula, and triturate them thoroughly together. Add fresh portions of the sugar of milk, from time to time, until the whole is added, and continue the trituration until the substance is intimately mixed with sugar of milk and finely comminuted.

TRITURATIO ELATERINI. U. S. Trituration of Elaterin.

Elaterin,	10 Gm. or 10 grains
Sugar of Milk, in moderately fine powder,	90 Gm. or 90 grains
To make	100 Gm. or 100 grains

Mix them thoroughly by trituration.

Average dose.—0.030 Gm.=30 milligrammes ($\frac{1}{2}$ grain).

This serves as a sample formula, the only one that is given as official in the U. S. P. Others may be made in the same manner.

TROCHISCI—TROCHES.

Troches, or lozenges, are flat or slightly convex bodies, made up in various shapes, usually containing some medicinal agent mixed with sugar and gum or other adhesive substance and intended to dissolve slowly in the mouth, and by their solution apply the medicinal agent to the internal surface of the throat and surrounding organs.

Like sugar-coated pills, they are now seldom prepared by druggists, manufacturers having mostly monopolized the business and driven the official troches out of use by introducing more elegant or convenient preparations.

Many of the medicinal agents that are introduced in the form of troches in the Pharmacopœia formulæ seem inappropriate to be exhibited in this form. It would seem natural that only such remedies should be used in troches as, by their natural slow solution, would act locally upon the mucous membrane of the parts with which they come in contact—the throat, larynx etc.

Preparation of Troches.

To make troches, a board about 5 x 10 inches, with a rim projecting above its surface about $\frac{1}{8}$ of an inch, and a cylindrical rolling-pin should be provided. The ingredients are then to be mixed into a stiff mass or dough, the board dusted with a mixture of powdered sugar and starch, and the mass rolled out between the projecting lateral edges of the board, filling it entirely from end out, as far as it will. It is then to be divided with a knife or spatula into the required number of troches, and dried by gentle heat. Lozenge cutters that make about 12 grain troches may be obtained of jobbers or dealers in pharmaceutical apparatus, but they cut only a definite size, not adapting themselves to the specific quantity of the medicinal agent directed in the formula.

In the official formulas which follow the U. S. formulas are for a sufficient quantity of the ingredients to make 100 lozenges or troches, and the title given in the plural,—Trochisci. The Br. formulas are for a single lozenge only, it being expected that the quantities of the ingredients directed will be multiplied by the number of lozenges which are to be made. The title of the Br. formulas is in the singular, Trochiscus.

In the Appendix to the Br. P., 1898, directions for preparing lozenges with different bases which are referred to as "fruit basis," "rose basis," "simple basis," and "tolu basis" in the following formulas are:

Preparations with Fruit Basis. Take 500 times the quantity of the drug ordered for one lozenge; mix it intimately with 15½ ounces (or

439½ Gm.) of refined sugar in fine powder, and 300 grains (or 19½ Gm.) of gum acacia in powder. Make the mixture into a paste with 1¼ fl.ounces (or 35½ Cc.) of mucilage of gum Arabic and 2 ounces (or 56¾ Gm.) of the black-currant paste of commerce, previously softened with boiling distilled water, adding any additional distilled water that may seem necessary. Divide the mass into 500 equal lozenges. Dry them in a hot-air chamber at a moderate temperature.

Preparation with Rose Basis. Take 500 times the quantity of drug ordered for one lozenge; mix it intimately with 17½ ounces (or 496 Gm.) of refined sugar in fine powder, and 300 grains (or 19½ Gm.) of gum acacia in powder. Make the mixture into a paste with 5 fl.drachms (or 17½ Cc.) of mucilage of gum acacia and a sufficient quantity of official rose water. Divide the mass into 500 equal lozenges. Dry them in a hot-air chamber at a moderate temperature.

Preparation with Simple Basis. Take 500 times the quantity of drug ordered for one lozenge; mix it intimately with 17½ ounces (or 496 Gm.) of refined sugar in fine powder, and 300 grains (or 19½ Gm.) of gum Arabic in powder; make the mixture into a paste with 1¼ fl.ounces (or 35½ Cc.) of mucilage of gum acacia and a sufficient quantity of distilled water. Divide the mass into 500 equal lozenges. Dry them in a hot-air chamber at a moderate temperature.

Preparation with Tolu Basis. Take 500 times the quantity of the drug ordered for one lozenge; dissolve what salts of alkaloids may be ordered in 3 fl.drachms (or 10½ Cc.) of distilled water; mix the solution intimately with 17 ounces (or 482 Gm.) of refined sugar in fine powder, and 300 grains (or 19½ Gm.) of gum acacia in powder. Thoroughly incorporate with the mixture any other drug ordered for the lozenge, and 3 fl.drachms (or 10½ Cc.) of tincture of balsam of tolu. Make into a paste with 1¼ fl.ounces (or 35½ Cc.) of mucilage of gum acacia and any additional distilled water that may be necessary. Divide the mass into 500 equal lozenges. Dry them in a hot-air chamber at a moderate temperature.

TROCHISCUS ACIDI BENZOICI. Br. Benzoic Acid Lozenge.

Benzoic Acid, ½ grain or 0.0324 Gm.
Mix with the fruit basis to form a lozenge. <Br.

TROCHISCUS ACIDI CARBOLICI. Br. Phenol Lozenge.

Phenol, 1 grain or 0.0648 Gm.
Mix with the tolu basis to form a lozenge. <Br.

TROCHISCI ACIDI TANNICI. U. S. Troches of Tannic Acid.

Tannic Acid, 6 Gm. or 92 grains
Sugar, 65 Gm. or 1000 grains
Tragacanth, 2 Gm. or 32 grains
Stronger Orange Flower Water, to make 100 troches,

The powders are to be rubbed together and made into a mass with orange flower water, which is to be divided into 100 troches. <U. S.

Trochiscus Acidi Tannici. Br. Tannic Acid Lozenge. Tannic acid $\frac{1}{2}$ grain (or 0.0324 Gm.). Mix with the fruit basis to form a lozenge.

TROCHISCI AMMONII CHLORIDI. U. S.

Troches of Ammonium Chloride.

Ammonium Chloride,	10 Gm. or 154 grains
Extract of Glycyrrhiza,	25 Gm. or 386 grains
Tragacanth,	2 Gm. or 31 grains
Sugar,	50 Gm. or 771 grains

Syrup of Tolu, sufficient to make 100 troches.

The powders are to be rubbed together and a mass made with syrup of tolu, which is to be divided into 100 troches. <U. S.

TROCHISCUS BISMUTHI COMPOSITUS. Br.

Compound Bismuth Lozenge.

Bismuth Oxycarbonate,	2 grains or 0.1296 Gm.
Heavy Magnesium Carbonate,	2 grains or 0.1296 Gm.
Precipitated Calcium Carbonate,	4 grains or 0.2592 Gm.

Mix with the rose basis to form a lozenge.<Br.

TROCHISCUS CATECHU. Br. Catechu Lozenge.

Catechu,	1 grain or 0.0648 Gm.
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Mix with the simple basis to form a lozenge.

TROCHISCI CUBEÆ. U. S. Troches of Cubebs.

Oleoresin of Cubeb,	2 Gm. or 31 grains
Oil of Sassafras,	1 Cc. or 16 minims
Extract of Glycyrrhiza,	25 Gm. or 386 grains
Acacia, powdered,	12 Gm. or 185 grains

Syrup of Tolu, sufficient to make 100 troches.

The powders are to be rubbed together and thoroughly mixed, the oleoresin and oil are then added and thoroughly incorporated and a mass made with the syrup tolu, which is to be divided into 100 troches. <U. S.

TROCHISCUS EUCALYPTI GUMMI. Br.

Eucalyptus Gum Lozenge. Red Gum Lozenge.

Eucalyptus Gum,	1 grain or 0.0684 Gm.
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Mix with the fruit basis to form a lozenge.<Br.

TROCHISCUS FERRI REDACTI. Br.

Reduced Iron Lozenge.

Reduced Iron,	1 grain or 0.0648 Gm.
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Mix with the simple basis to form a lozenge.<Br.

TROCHISCI GAMBIR. U. S. Troches of Gambir.

[To replace Trochisci Catechu, Pharm. 1900].

These troches are the same composition as in the formula for Troches of Catechu of the 7th Revision, the name, only, being changed.

Gambir, in fine powder, 6 Gm. or 92 grains

Sugar, in fine powder, 65 Gm. or 1000 grains

Tragacanth, in fine powder, 2 Gm. or 31 grains

Stronger Orange Flower Water, sufficient to make 100 troches.

The powders are to be thoroughly mixed and a mass made with the orange flower water, which is to be divided into 100 troches.

TROCHISCI GLYCYRRHIZÆ ET OPII. U. S.

Troches of Glycyrrhiza and Opium.

Extract of Glycyrrhiza, fine powder, 15 Gm. or 231 grains

Powdered Opium, 0.5 Gm. or 8 grains

Acacia, fine powder, 12 Gm. or 185 grains

Sugar, fine powder, 20 Gm. or 308 grains

Oil of Anise, 0.2 Cc. or 3 minims

Water, a sufficient quantity to make 100 troches.

The powders are to be rubbed together and mixed with the syrup the oil added, and then the water, to form a mass which is to be divided into 100 troches. <U. S.

These are called Brown Mixture Lozenges.

TROCHISCUS GUAIACI RESINÆ. Br.

Guaiacum Resin Lozenge.

Guaiacum Resin, 3 grains or 0.1944 Gm.

Mix with the fruit basis to form a lozenge. <Br.

TROCHISCI IPECACUANHÆ. U. S. Troches of Ipecac.

Ipecac, powdered, 2 Gm. or 31 grains

Tragacanth, powdered, 2 Gm. or 31 grains

Sugar, powdered, 65 Gm. or 1000 grains

Syrup of Orange, sufficient to make 100 troches.

The powders are to be rubbed together and made with the syrup into a mass, which is to be divided into 100 troches. <U. S.

Trochiscus Ipecacuanhæ. Br. Ipecacuanha Lozenge. Ipecacuanha root, in powder, $\frac{1}{4}$ grain (or 0.0162 Gm.). Mix with the fruit basis to form a lozenge. <Br.

TROCHISCI KRAMERIÆ. U. S. Troches of Krameria.

Extract of Krameria, 6 Gm. or 92 grains

Sugar, 65 Gm. or 1000 grains

Tragacanth, 2 Gm. or 31 grains

Stronger Orange Flower Water, sufficient to make 100 troches.

The powders are to be rubbed together and then with the orange flower water, made into a mass, which is to be divided into 100 troches. < U. S.

Trochiscus Krameriaë. Br. Krameria Lozenge. Extract of krameria 1 grain (or 0.0648 Gm.). Mix with the fruit basis to form a lozenge. < Br.

TROCHISCUS KRAMERIÆ ET COCAINÆ. Br.

Krameria and Cocaine Lozenge.

Extract of Krameria, 1 grain or 0.0648 Gm.

Cocaine Hydrochloride, $\frac{1}{20}$ grain or 0.00324 Gm.

Mix with the fruit basis to form a lozenge. < Br.

TROCHISCUS MORPHINÆ. Br. Morphine Lozenge.

Morphine Hydrochloride, $\frac{1}{36}$ grain or 0.0018 Gm.

Mix with the tolu basis to form a lozenge. < Br.

TROCHISCUS MORPHINÆ ET IPECACUANHÆ. Br.

Morphine and Ipecacuanha Lozenge.

Morphine Hydrochloride, $\frac{1}{36}$ grain or 0.0018 Gm.

Ipecacuanha Root, in powder, $\frac{1}{12}$ grain or 0.0054 Gm.

Mix with the tolu basis to form a lozenge. < Br.

TROCHISCI POTASSII CHLORATIS. U. S.

Troches of Potassium Chlorate.

Potassium Chlorate, 30 Gm. or 463 grains

Sugar, 120 Gm. or 1851 grains

Tragacanth, 6 Gm. or 92 grains

Spirit of Lemon, 1 Cc. or 16 minims

Water, sufficient to make 100 troches.

The powders are to be mixed, the spirit of lemon added and then water to make a mass, which is to be divided into 100 troches. < U. S.

Care must be used in making these troches to prevent explosions or ignition; a bone or wood spatula should be used, and the mass should be mixed without pounding or great pressure.

Trochiscus Potassii Chloratis. Br. Potassium Chlorate Lozenge. Potassium chlorate 3 grains (or 0.1944 Gm.). Mix with the rose basis to form a lozenge. < Br.

TROCHISCI SANTONINI. U. S. Troches of Santonin.

Santonin, in fine powder, 3 Gm. or 46 grains

Sugar, in fine powder, 110 Gm. or 1698 grains

Tragacanth, in fine powder, 2 Gm. or 46 grains

Stronger Orange Flower Water, sufficient to make 100 troches.

The powders are to be rubbed together until they are thoroughly mixed; then, with stronger orange flower water, made into a mass which is to be divided into 100 troches. <U. S.

Trochiscus Santonini. Br. Santonin Lozenge. Santonin 1 grain (or 0.0648 Gm.). Mix with the simple basis to form a lozenge. <Br.

TROCHISCI SODII BICARBONATIS. U. S.

Troches of Sodium Bicarbonate.

Sodium Bicarbonate,	20 Gm. or 310 grains
Sugar, in fine powder,	60 Gm. or 926 grains
Myristica, bruised,	1 Gm. or 15 grains
Mucilage of Tragacanth, sufficient to make 100 troches.	

The myristica is to be triturated with the sugar, gradually added, and then mixed intimately with the sodium bicarbonate. The powder is to be made into a mass with the mucilage and divided into 100 troches. <U. S.

Trochiscus Sodii Bicarbonatis. Br. Sodium Bicarbonate Lozenge. Sodium bicarbonate 3 grains (or 0.1944 Gm.). Mix with the rose basis to form a lozenge. <Br.

TROCHISCUS SULPHURIS. Br. Sulphur Lozenge.

Precipitated Sulphur,	162.0 Gm. or 2500 grains
Acid Potassium Tartrate,	32.4 Gm. or 500 grains
Refined Sugar,	259.2 Gm. or 4000 grains
Gum Acacia,	32.4 Gm. or 500 grains
Mucilage of Gum Acacia,	29.5 Cc. or 500 minims
Tincture of Orange,	29.5 Cc. or 500 minims

Mix the tincture of orange with the powder; add the mucilage of gum acacia to form a suitable mass. Divide into 500 lozenges. Dry them in a hot air chamber at a moderate temperature. Each lozenge contains 5 grains (0.324 Gm.) of precipitated sulphur. <Br.

TROPACOCAINE. Benzoylpseudotropine.



This alkaloid is obtained from coca leaves in the form of an oily substance having a strong alkaline reaction.

Tropacocaine Hydrochloride. This is prepared by neutralizing diluted hydrochloric acid with tropacocaine (alkaloid), concentrating the solution and allowing to crystallize. The crystals are colorless and very soluble in water. The solution of this salt is used as a local anesthetic, and is considered more powerful and less toxic than cocaine. For external application a 3 to 10 percent. solution may be used. For subcutaneous injection, $\frac{1}{4}$ to $\frac{1}{2}$ grain.

TUBERCULINUM KOCHI. P. G. Tuberculin.

This is a culture product which has been used extensively as a cure for tuberculosis, and has been known as Koch's Consumption Cure.

It is a clear, brown, aromatic liquid, obtained from the cultures of *tuberculum baccillus*, reduced by evaporation and preserved with 40 percent. of glycerin. It is prepared only in bacteriological laboratories, and is furnished in original small bottles, which are not to be opened nor diluted until used, and should be kept in a cool, dark place.

TUMENOL.

This is a mixture of sulphones and sulphonic acid, prepared from bituminous shale oils. It is similar to thiol, and the method of preparing it is similar. It is a blackish-brown liquid, of the consistence of syrup, or may be made into a paste or powder. It is employed usually in the form of ointment for eczema and itching of all kinds; it may also be used in solution or as a dusting powder, the same as thiol.

UNGUENTA — OINTMENTS.

As understood in pharmacy ointments are fatty preparations of solid or semi-solid consistence, intended for external application, and usually containing some medicinal substance or substances designed either to be absorbed or to act upon the parts to which the ointment is applied.

In U. S. pharmacy ointments differ from cerates chiefly in consistence—the ointments as a class being softer than the cerates and being intended generally for rubbing on or in, while the cerates are usually spread and applied like plasters. In Br. pharmacy there is no distinction; all preparations of this kind being classed as ointments. In Fr., It., Mex. and Sp. pharmacy Cerates, Pomades and Ointments are official. Cerates all contain wax and are much like the U. S. Cerates; Pomades are of softer consistence, and Ointments usually contain resin or some like substance, making them firmer and more adhesive than the pomades.

Ointments are also frequently called "salves," which corresponds to the common names given them in several foreign pharmacopœias.

The following are the ointments official in the U. S. and Br. Pharmacopœias:

UNGUENTUM. U. S. Simple Ointment.

Benzoinated Lard,	800 Gm. or 8 ounces
Yellow Wax,	200 Gm. or 2 ounces

The wax is to be melted and the lard gradually added, heating gently until liquified. When melted it is to be set aside until it begins to "chill," then it is to be stirred until it congeals. < U. S.

Unguentum Simplex. Dutch. Yellow wax 30 parts, olive oil 70 parts. Melt the wax and add the oil.

Unguentum Cereum. G. The same as the foregoing.

Unguentum Paraffini. Br. Paraffin Ointment. Hard paraffin 3 ounces, soft paraffin 7 ounces. Melt together in a shallow evaporating dish; as the liquid cools triturate constantly, until, when cold, a uniform plastic ointment is produced. This may be made of either white or yellow paraffin.

The foregoing bases are directed to be used in several of the ointments.

UNGUENTUM ACIDI BORICI. U. S., Br. Boric Acid Ointment.

The U. S. P. formula is:

Boric Acid, in fine powder,	100 Gm. or 1 ounce
Paraffin,	100 Gm. or 1 ounce
White Petrolatum,	800 Gm. or 8 ounces

"Melt the paraffin, add the white petrolatum, and heat gently for 10 minutes. Then gradually add the hot liquid to the boric acid contained in a warm mortar, triturating thoroughly, and stir the mixture until it congeals." <U. S.

UNGUENTUM ACIDI CARBOLICI. Br. Phenol Ointment.

Phenol,	15 Gm. or ½ ounce av.
Glycerin,	45 Gm. or 1½ ounces av.
Paraffin Ointment, white,	315 Gm. or 10½ ounces av.

"Dissolve the phenol in the glycerin; add the paraffin ointment; mix." <Br.

The U. S. P. formula for this ointment is under the title *Unguentum Phenolis*, which see.

UNGUENTUM ACIDI SALICYLICI. Br.

Salicylic Acid Ointment.

Salicylic Acid, in powder,	0.5 Gm. or 10 grains
Paraffin Ointment, white,	245 Gm. or 490 grains
Mix.	

UNGUENTUM ACIDI TANNICI. U. S.

Ointment of Tannic Acid.

Tannic Acid, in very fine powder,	20 Gm. or 1 ounce
Glycerin,	20 Gm. or 1 ounce
Benzoinated Lard,	60 Gm. or 3 ounces

"Dissolve the tannic acid in the glycerin with the aid of gentle heat, and mix the solution thoroughly with the ointment in a mortar, avoiding the use of iron utensils." <U. S.

UNGUENTUM ACONITINÆ. Br. Aconitine Ointment.

Aconitine,	0.5 Gm. or 10 grains
Oleic Acid,	4 Gm. or 80 grains
Lard,	20.5 Gm. or 410 grains

"Rub the aconitine with the oleic acid and gently warm the mixture until dissolved; add the lard; mix." <Br.

This is, in fact, aconitine oleate, reduced with lard. It is of the same strength as Veratrine Oleate of the U. S. P.

UNGUENTUM ADIPIS LANÆ. P. G. Lanolin Ointment.

Lanolin,	20 parts
Water,	5 parts
Olive Oil,	5 parts

Melt the lanolin on a water-bath, add the water and the olive oil, and while cooling beat them together.

UNGUENTUM AQUÆ ROSÆ. U. S., Br.

Ointment of Rose Water. U. S. Rose Water Ointment. Br.

Spermaceti,	125 Gm. or 4 $\frac{3}{4}$ ounces av.
White Wax,	120 Gm. or 4 $\frac{5}{8}$ ounces av.
Expressed Almond Oil,	560 Gm. or 19 fl.ounces
Stronger Rose Water,	190 Gm. or 6 $\frac{1}{2}$ fl.ounces
Sodium Borate,	5 Gm. or 77 grains

The spermaceti and white wax are to be reduced to fine shavings and melted at a moderate heat. The expressed oil of almond is then to be added and the mixture poured into a warmed, shallow wedge-wood mortar, carefully adding, without stirring, the whole of the stronger rose water in which the sodium borate has previously been dissolved. It is then to be stirred rapidly and continuously until the mixture becomes uniformly soft and creamy. <U. S.

The addition of borax in the U. S. formula helps to hold the ingredients from separating, and acts, as well, as an antiseptic.

The Br. formula is:

Rose Water, undiluted,	210 Cc. or 7 fl.ounces
White Beeswax,	45 Gm. or 1 $\frac{1}{2}$ ounces
Spermaceti,	45 Gm. or 1 $\frac{1}{2}$ ounces
Almond Oil,	270 Gm. or 9 ounces
Oil of Rose,	0.5 Gm. or 8 minims

"Melt together the white beeswax, spermaceti and almond oil; pour the mixture into a warmed mortar and add the rose water gradually with constant trituration; add the oil of rose; continue the trituration until cold." <Br.

Unguentum Leniens. P. G. Cold Cream. White wax 7 parts, spermaceti 8 parts, almond oil 57 parts, rose water 28 parts. Make in the same manner as the Br.

UNGUENTUM ATROPINÆ. Br. Atropine Ointment.

Atropine,	0.5 Gm. or 10 grains
Oleic Acid,	2.0 Gm. or 40 grains
Lard,	22.5 Gm. or 450 grains

"Rub the atropine with the oleic acid, and gently warm the mixture until dissolved; add the lard; mix." <Br. (2% strength).

This is an oleate of atropine reduced with lard.

UNGUENTUM BASILICUM. P. G. Basilicon Ointment.

Olive Oil,	9 parts
Yellow Wax,	3 parts
Resin,	3 parts
Mutton Tallow,	3 parts
Turpentine, (gum),	2 parts

Melt the solid substances together and incorporate the oil.

UNGUENTUM BELLADONNÆ. U. S., Br.

Belladonna Ointment.

The U. S. P. formula is:

Extract of Belladonna Leaves,	10 Gm. or 1 ounce
Diluted Alcohol,	5 Cc. or $\frac{1}{2}$ fl.ounce
Hydrated Wool-Fat,	20 Gm. or 2 ounces
Benzoinated Lard,	65 Gm. or $6\frac{1}{2}$ ounces

The extract is to be rubbed with the diluted alcohol until a smooth mixture is obtained. With this incorporate the hydrous wool-fat, then add the benzoinated lard and mix thoroughly. <U. S.

The Br. formula is:

Liquid Extract of Belladonna,	40 Cc. or 2 fl.ounces
Benzoinated Lard,	45 Gm. or $2\frac{1}{4}$ ounces

"Evaporate the liquid extract of belladonna on a water-bath until it is reduced to $\frac{1}{4}$ ounce (or 5 Gm.), add the benzoinated lard; mix. 100 parts of this ointment should contain 0.6 part of the alkaloids of belladonna root." <Br.

"It will be observed that the U. S. directs an extract prepared from the leaves, while the Br. directs a liquid extract prepared from the root of belladonna.

UNGUENTUM BENZOINI.

Ointment of Benzoin. Benzoinated Lard.

This preparation was formerly classed among the ointments, but later was known in the U. S. P. as "Adeps Benzoinatus," which title it still retains. As it is still frequently called for as Benzoin Ointment, and appears in several of the foreign pharmacopœias under a similar title, it is mentioned here with reference to Adeps Benzoinatus for the formula.

Benzoinated Petrolatum.

Petrolatum, white or amber,	15 ounces
Wax, white or yellow,	1 ounce
Benzoin, in coarse powder,	$\frac{1}{4}$ ounce

Melt the wax and petrolatum together, and, having tied the benzoin loosely in a piece of coarse muslin, suspend it in the melted mixture, stirring them frequently and continuing the heat for 2 hours at a temperature not exceeding 60°C. (150°F.), and strain and stir while cooling.

The quantity of wax should vary a little to correspond with the melting point of the petrolatum used, 1 ounce being used for petrolatum melting at 120°F., and about one-fourth more for that which melts at 104°F., the object being to have the preparation about the consistence of lard. White petrolatum with white wax makes a beautiful ointment base, and keeps without change for any length of time. The amber petrolatum and yellow wax make just as good an ointment except in color.

UNGUENTUM CANTHARIDIS. Br. Cantharides Ointment.

Cantharides, bruised,	30 Gm. or 1 ounce
Benzoinated Lard,	300 Gm. or 10 ounces

"Melt the benzoinated lard, add the cantharides and digest at a temperature of about 120°F. (48.9°C.), for 12 hours, strain through calico and press the residue gently; stir until cold." <Br.

UNGUENTUM CANTHARIDUM PRO USU VETERINARIO. P. G.

Spanischfliegensalbe für thierärztlichen Gebrauch. G.

Cantharides, in powder,	2 parts
Olive Oil,	2 parts
Lard,	2 parts

Heat together in a water-bath for 10 hours, then add

Yellow Wax,	1 part
Turpentine,	2 parts

Melt them together and add

Euphorbium, in powder,	1 part
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Incorporate them well together while cooling.

UNGUENTUM CAPSICI. Br. Capsicum Ointment.

Capsicum Fruit, bruised,	12 Gm. or 120 grains
Spermaceti,	6 Gm. or 60 grains
Olive Oil,	44 Gm. or 1 ounce

"Digest on a water-bath for 1 hour, occasionally stirring, strain, set aside to cool, without stirring." <Br.

UNGUENTUM CEREUM. P. G. Wachsälbe.

Olive Oil,	7 parts
Yellow Wax,	3 parts

Melt the wax and olive oil together.

UNGUENTUM CETACEI. Br. Spermaceti Ointment.

Spermaceti,	200 Gm. or 20 ounces
White Beeswax,	80 Gm. or 8 ounces
Almond Oil,	720 Gm. or 72 ounces
Benzoin, in coarse powder,	20 Gm. or 2 ounces

"Melt together the spermaceti, beeswax and almond oil; add the benzoin and, frequently stirring the mixture, continue the application of heat for 2 hours; remove from the source of heat; strain; and stir the ointment constantly until cold." <Br.

UNGUENTUM CHRYSAROBINI. U. S., Br.**Chrysarobin Ointment.**

The U. S. P. formula is:

Chrysarobin,	6 Gm. or 60 grains
Benzoinated Lard,	94 Gm. or 2 $\frac{1}{8}$ ounces av.

"Triturate the chrysarobin with the benzoinated lard, previously melted, and heat the mixture on a water-bath with occasional stirring for 20 minutes; then strain and stir until it congeals." <U. S.

The Br. formula is:

Chrysarobin,	2 Gm. or 20 grains
Benzoinated Lard,	48 Gm. or 480 grains

"Triturate the chrysarobin gradually with the benzoinated lard, previously melted by heat; continue the heat until the chrysarobin is dissolved; stir until cold." <Br.

UNGUENTUM COCAINÆ. Br. Cocaine Ointment.

Cocaine,	1 Gm. or 20 grains
Oleic Acid,	4 Gm. or 80 grains
Lard,	20 Gm. or 400 grains

"Rub the cocaine with the oleic acid, gently warm the mixture until dissolved; add the lard; mix." <Br.

This is really an oleate of cocaine, reduced with lard. Observe that the alkaloid must be used as salts of alkaloids do not unite with oleic acid.

UNGUENTUM CONII. Br. Conium Ointment.

Juice of Conium,	88 Cc. or 2 fl.ounces
Hydrous Wool-Fat,	33 Gm. or $\frac{3}{4}$ ounce

"Evaporate the juice of conium on a water-bath to one-eighth of its volume at a temperature not exceeding 140°F. (60°C.), add the hydrous wool-fat. Mix by trituration." <Br.

UNGUENTUM CREOSOTI. Br. Creosote Ointment.

Creosote,	30 Gm. or 1 ounce
Soft Paraffin, (white),	150 Gm. or 5 ounces
Hard Paraffin,	120 Gm. or 4 ounces

"Melt the hard and soft paraffins together; add the creosote; stir until cold." < Br.

UNGUENTUM DIACHYLON. U. S. Diachylon Ointment.

Lead Plaster,	.50 Gm. or 5 ounces av.
Olive Oil,	49 Gm. or 4.9 ounces av.
Oil of Lavender Flowers,	1 Gm. or 46 minims

"Melt the lead plaster by applying a gentle heat, add the olive oil and mix thoroughly; then allow the mixture to cool, add the oil of lavender flowers, and stir the ointment until it congeals. It should be prepared extemporaneously." < U. S.

UNGUENTUM EUCALYPTI. Br. Eucalyptus Ointment.

Oil of Eucalyptus,	30 Gm. or 1 ounce
Hard Paraffin,	120 Gm. or 4 ounces
Soft Paraffin, white,	150 Gm. or 5 ounces

"Melt the hard and soft paraffins together; add the oil of eucalyptus; stir until cold." < Br.

UNGUENTUM GALLÆ. U. S. Nutgall Ointment.

Nutmeg, in very fine powder,	20 Gm. or 2 ounces
Ointment,	80 Gm. or 8 ounces

The nutmeg is to be rubbed with the ointment gradually added, until they are thoroughly mixed. Avoid the use of metallic utensils. < U. S.

UNGUENTUM GALLÆ. Br. Gall Ointment.

Galls, in very fine powder,	30 Gm. or 1 ounce
Benzoinated Lard,	120 Gm. or 4 ounces

Mix by trituration. < Br.

UNGUENTUM GALLÆ CUM OPIO. Br.

Gall and Opium Ointment.

Gall Ointment,	92.5 Gm. or 925 grains
Opium, in fine powder,	7.5 Gm. or 75 grains

Mix by trituration. < Br.

100 parts of this ointment contain $7\frac{1}{2}$ parts of opium.

UNGUENTUM GLYCERINI PLUMBI SUBACETATIS. Br.

Lead Subacetate Ointment.

Glycerin of Lead Subacetate,	30 Gm. or 1 ounce
Paraffin Ointment, white,	150 Gm. or 5 ounces

Mix. < Br.

UNGUENTUM HAMAMELIDIS. Br. Hamamelis Ointment.

Liquid Extract of Hamamelis,	10 Cc. or $\frac{1}{4}$ fl.ounce
Hydrous Wool-Fat,	90 Gm. or $2\frac{1}{4}$ ounces

Mix. < Br.

UNGUENTUM HYDRARGYRI. U. S., Br.**Mercurial Ointment. Mercury Ointment.**

The U. S. P. formula is:

Mercury,	500 Gm. or	1 pound
Benzoinated Lard,	250 Gm. or	$\frac{1}{2}$ pound
Prepared Suet,	230 Gm. or	$7\frac{1}{3}$ ounces av.
Oleate of Mercury,	20 Gm. or	309 grains

"Triturate the oleate of mercury in a warm mortar, add the mercury gradually by means of a pipette, and, when the globules are completely divided and distributed, set it aside for about 15 minutes. Melt the lard and suet, allow the mixture to partially cool, and add about 25 Gm. (or 370 grains) of it to the mercurial mixture, and continue the trituration until globules are no longer visible under a lens magnifying 10 diameters. Then add the remainder of the lard and suet and mix them thoroughly." <U. S.

An assay process is given in the U. S. P. by which the proportion of mercury contained in a given quantity of the ointment may be ascertained and separated. The U. S. P. formula should produce an ointment containing $\frac{1}{2}$ mercury by weight.

The Br. formula is:

Mercury,	160 Gm. or 16 ounces
Lard,	160 Gm. or 16 ounces
Prepared Suet,	10 Gm. or 1 ounce

"Triturate until the metallic globules cease to be visible." <Br.

UNGUENTUM HYDRARGYRI AMMONIATI. U. S., Br.**Ointment of Ammoniated Mercury. White Precipitate Ointment.**

Ammoniated Mercury, in very	
fine powder,	10 Gm. or 1 ounce
White Petrolatum,	50 Gm. or 5 ounces
Hydrous Wool-Fat,	40 Gm. or 4 ounces
To make	100 Gm. or 10 ounces

"Rub the ammoniated mercury with an equal weight of the melted white petrolatum, then add the remainder of the melted white petrolatum; mix thoroughly with the hydrous wool-fat and stir the mixture until it congeals." <U. S.

The Br. formula is:

Ammoniated Mercury,	30 Gm. or 1 ounce
Paraffin Ointment, white,	270 Gm. or 9 ounces

It is of advantage in making this ointment, as well as other ointments in which a precipitate or dense powder is to be incorporated to first rub the precipitate with glycerin in a mortar, taking about one-fifth as much glycerin as is directed of the powdered substance. This mixture is then incorporated by rubbing with the fatty constituents.

UNGUENTUM HYDRARGYRI COMPOSITUM. Br.**Compound Mercury Ointment.**

Mercury Ointment,	150 Gm. or 10 ounces
Yellow Beeswax,	90 Gm. or 6 ounces
Olive Oil,	90 Gm. or 6 ounces
Camphor,	45 Gm. or 3 ounces

"Mix the beeswax, olive oil and mercury with the aid of heat; add the camphor; triturate until cold." < Br.

UNGUENTUM HYDRARGYRI DILUTUM. U. S. Blue Ointment.

Mercurial Ointment,	670 Gm. or 6 oz. av.+131 grains
Petrolatum,	330 Gm. or 3 oz. av.+131 grains
To make	1000 Gm.

Mix them thoroughly. < U. S.

This ointment is what is known commercially as $\frac{1}{3}$ mercury ointment, or what is commonly called for as Blue Ointment or "Anguentum" (Unguentum). It is used medicinally as an alterative and commonly as a vermicide to kill parasites on man and animals.

UNGUENTUM HYDRARGYRI IODIDI RUBRI. Br.**Mercuric Iodide Ointment. Ointment of Red Iodide of Mercury.**

Mercuric Iodide, in fine powder,	2 Gm. or 20 grains
Benzoated Lard,	48 Gm. or 480 grains

Mix. < Br.

UNGUENTUM HYDRARGYRI NITRATIS. U. S., Br.**Ointment of Mercuric Nitrate. Citrine Ointment.**

The U. S. P. formula is:

Mercury,	70 Gm. or 2 ounces av.+205 grains
Lard, free from water,	760 Gm. or 10 ounces av.+353 grains
Nitric Acid,	175 Gm. or 6 ounces av.+113 grains

The lard is to be heated in a capacious glass or porcelain vessel to a temperature of 105°C . (221°F .). The heat is then to be withdrawn and 70 Gm. (or $2\frac{1}{2}$ ounces av.) of nitric acid added, and when reaction moderates heat is to be again applied until the effervescence ceases. The mixture is then allowed to cool to about 40°C . (104°F .), and, having dissolved the mercury in the remainder of the nitric acid by the aid of heat sufficient to prevent the solution from crystallizing, it is to be added to the mixture of lard and acid. When cold the ointment is to be mixed smooth by trituration, avoiding the use of a metallic spatula. < U. S.

The Br. formula is:

Mercury,	100 Gm. or 1 ounce
Nitric Acid,	300 Cc. or 3 fl.ounces

Lard,	400 Gm. or 4 ounces
Olive Oil,	700 Gm. or 7 ounces

"Dissolve the mercury in the nitric acid without the aid of heat, agitating gently from time to time. Heat the lard and olive oil together on a sand-bath, so that the mixture, when transferred to a heated earthenware jar capable of holding 10 times the quantity shall be at a temperature of about 290°F. (143.3°C.). Add the cold mercurial solution very gradually, stirring constantly to promote disengagement of fumes. After frothing has ceased, the mixture, which should have a temperature of not less than 200°F. (93.3°C.), must be kept stirred until it is cold. The resulting ointment should be firm in consistence and have a pale lemon color." < Br.

UNGUENTUM HYDRARGYRI NITRATIS DILUTUM. Br.

Diluted Mercuric Nitrate Ointment.

Mercuric Nitrate Ointment,	25 Gm. or 1 ounce
Soft Paraffin, yellow,	100 Gm. or 4 ounces
Mix. < Br.	

UNGUENTUM HYDRARGYRI OLEATIS. Br.

Mercuric Oleate Ointment.

Mercuric Oleate, (Br.),	20 Gm. or 1 ounce
Benzoated Lard,	60 Gm. or 3 ounces
Mix. < Br.	

UNGUENTUM HYDRARGYRI OXIDI FLAVI. U. S., Br.

Ointment of Yellow Mercuric Oxide.

The U. S. P. formula is:

Yellow Mercuric Oxide, in very fine powder,	10 Gm. or 1 ounce
Water,	10 Gm. or 1 ounce
Hydrous Wool-Fat,	40 Gm. or 4 ounces
Petrolatum,	40 Gm. or 4 ounces
To make	100 Gm. or 10 ounces

"Triturate the yellow mercuric oxide with the water until the mixture is perfectly smooth, then add the hydrous wool-fat in divided portions and incorporate thoroughly with the petrolatum, avoiding contact with metallic utensils." < U. S.

The Br. formula is:

Yellow Mercuric Oxide,	0.5 Gm. or 10 grains
Soft Paraffin, yellow,	245 Gm. or 490 grains
Mix. < Br.	

UNGUENTUM HYDRARGYRI OXIDI RUBRI. U. S., Br.**Ointment of Red Mercuric Oxide. Red Precipitate Ointment.**

The U. S. P. formula is:

Red Mercuric Oxide, in very fine powder,	10 Gm. or 1 ounce
Water,	10 Gm. or 1 ounce
Hydrous Wool-Fat,	40 Gm. or 4 ounces
Petrolatum,	40 Gm. or 4 ounces
To make	100 Gm. or 10 ounces

"Triturate the red mercuric oxide with the water until the mixture is perfectly smooth and absolutely free from gritty particles, then add the hydrous wool-fat in divided portions, and incorporate with the petrolatum. Contact with metallic utensils should be avoided." <U. S.

The Br. formula is:

Red Mercuric Oxide, in very fine powder,	10 Gm. or $\frac{1}{4}$ ounce
Paraffin ointment, yellow,	90 Gm. or $2\frac{1}{4}$ ounces
Mix. < Br.	

UNGUENTUM HYDRARGYRI SUBCHLORIDI. Br.**Mercurous Chloride Ointment. Calomel Ointment.**

Mercurous Chloride,	10 Gm. or $\frac{1}{4}$ ounce
Benzoated Lard,	90 Gm. or $2\frac{1}{4}$ ounces
Mix. < Br.	

UNGUENTUM IODI. U. S., Br. Iodine Ointment.

The U. S. P. formula is:

Iodine,	4 Gm. or 40 grains
Potassium Iodide,	4 Gm. or 40 grains
Glycerin,	12 Gm. or 120 grains
Benzoinated Lard,	80 Gm. or 800 grains

The iodine is to be rubbed with the iodide of potassium and glycerin in a glass mortar until dissolved, then with the benzoinated lard gradually added until they are thoroughly mixed, avoiding the use of a metallic spatula. It should be freshly made when required. <U. S.

The Br. formula is:

Iodine,	1 Gm. or 20 grains
Potassium Iodide,	1 Gm. or 20 grains
Glycerin,	3 Gm. or 60 grains
Lard,	20 Gm. or 400 grains

Triturate the iodine, potassium iodide and glycerin in a glass or porcelain mortar; add the lard gradually. Mix. < Br.

UNGUENTUM IODOFORMI. U. S., Br. Iodoform Ointment.

The U. S. P. formula is:

Iodoform, in very fine powder,	10 Gm. or 50 grains
Lard,	90 Gm. or 450 grains

The iodoform is to be rubbed with the lard, gradually added, until they are thoroughly mixed. It should be freshly prepared when wanted for use. <U. S.

The Br. formula is:

Iodoform, in fine powder,	10 Gm. or $\frac{1}{4}$ ounce
Paraffin Ointment, yellow,	90 Gm. or $2\frac{1}{4}$ ounces

Mix. <Br.

UNGUENTUM PARAFFINI. Br. Paraffin Ointment.

Hard Paraffin,	90 Gm. or 3 ounces
Soft Paraffin,	210 Gm. or 7 ounces

Melt together in a shallow evaporating dish; as the liquid cools triturate constantly, until, when cold, a uniform plastic ointment is produced. <Br.

The U. S. and Br. are the same practically.

When paraffin ointment is used as the basis of white ointments, it should be prepared with the white varieties of soft paraffin; and when used in colored ointments, it should be prepared with the yellow variety of soft paraffin.

UNGUENTUM PHENOLIS. U. S. Ointment of Phenol.

[Ointment of Carbolic Acid, Pharm. 1890].

Phenol,	3 Gm. or $\frac{3}{8}$ ounce.
White Petrolatum,	97 Gm. or $12\frac{1}{8}$ ounces

"To the melted white petrolatum add the phenol, and stir the mixture until it begins to congeal." <U. S.

This is a 3% ointment. This ointment may be made of other strengths, the 5% being probably, more frequently used than any. It may be made with phenol $\frac{1}{2}$ ounce, white petrolatum $9\frac{1}{2}$ ounces.

UNGUENTUM PICIS LIQUIDÆ. U. S., Br. Tar Ointment.

The U. S. P. formula is:

Tar,	500 Gm. or 5 ounces
Yellow Wax,	125 Gm. or $1\frac{1}{4}$ ounces
Lard,	375 Gm. or $3\frac{3}{4}$ ounces

The wax and lard are to be melted together, the tar, previously warmed, incorporated and the mixture strained and stirred while cooling. <U. S.

The Br. P. formula is:

Tar,	100 Gm. or 5 ounces
Yellow Beeswax,	40 Gm. or 2 ounces

"Melt the beeswax at a low temperature, add the tar, stir the mixture until cold." < Br.

UNGUENTUM PLUMBI. P. G. Lead Ointment. Bleisalbe.

Solution of Lead Subacetate,	1 part
Wool-Fat, (Lanolin),	1 part
Paraffin Ointment,	8 parts

Rub the solution first with the lanolin to a smooth paste, then incorporate the paraffin.

UNGUENTUM PLUMBI ACETATIS. Br.

Lead Acetate Ointment.

Lead Acetate, in fine powder,	2 Gm. or 20 grains
Paraffin Ointment, white,	48 Gm. or 480 grains
Mix. < Br.	

UNGUENTUM PLUMBI CARBONATIS. Br.

Ointment of Lead Carbonate. Lead Carbonate Ointment.

Lead Carbonate, in fine powder,	10 Gm. or $\frac{1}{4}$ ounce
Paraffin Ointment, white,	90 Gm. or $2\frac{1}{4}$ ounces
Mix. < Br.	

UNGUENTUM PLUMBI IODIDI. Br.

Ointment of Lead Iodide. Lead Iodide Ointment.

Lead Iodide,	10 Gm. or $\frac{1}{4}$ ounce
Paraffin Ointment, yellow,	90 Gm. or $2\frac{1}{4}$ ounces
Mix. < Br.	

UNGUENTUM PLUMBI TANNICI. P. G.

Lead Tannate Ointment. Gerbsäure-Bleisalbe. G.

Tannic Acid,	1 part
Solution of Lead Subacetate,	2 parts
Lard,	17 parts
Mix them well together.	

UNGUENTUM POTASSII IODIDI. U. S., Br.

Ointment of Potassium Iodide.

The U. S. P. formula is: •

Potassium Iodide,	10.0 Gm. or 154 grains
Potassium Carbonate,	0.6 Gm. or 95 grains
Water,	10.0 Gm. or 154 grains
Benzoinated Lard,	80.0 Gm. or $2\frac{3}{4}$ ounces

"Dissolve the potassium salts in the water by trituration, then gradually add the benzoinated lard and incorporate thoroughly. This ointment should be prepared extemporaneously." < U. S.

The Br. P. formula is:

Potassium Iodide,	5 Gm. or 50 grains
Potassium Carbonate,	0.3 Gm. or 3 grains
Distilled Water,	4.7 Gm. or 47 grains
Benzoated Lard,	40 Gm. or 400 grains

Dissolve the potassium iodide and the potassium carbonate in the distilled water; mix the solutions gradually with the benzoated lard in a slightly warmed mortar.

UNGUENTUM RESINÆ. Br. Resin Ointment.

[Basilicon Ointment].

Resin, in powder,	200 Gm. or 8 ounces
Yellow Beeswax,	200 Gm. or 8 ounces
Olive Oil,	200 Gm. or 8 ounces
Lard,	150 Gm. or 6 ounces

"Add the lard and olive oil to the previously melted resin and beeswax; strain; stir until cold." < Br.

UNGUENTUM ROSMARINI COMPOSITUM. P. G.

Compound Rosemary Liniment. Rosmarinsalbe. G.

Lard,	16 parts
Mutton Tallow,	8 parts
Yellow Wax,	2 parts
Nutmeg Oil, (butter),	2 parts
Oil of Rosemary,	1 part
Oil of Juniper,	1 part

Melt the solids together and when cooling add the oils.

UNGUENTUM STAPHISAGRIÆ. Br. Stavesacre Ointment.

Stavesacre Seeds,	40 Gm. or 2 ounces
Yellow Beeswax,	20 Gm. or 1 ounce
Benzoated Lard,	170 Gm. or 8½ ounces

"Crush the stavesacre seeds; digest the crushed seeds with the benzoated lard on a water-bath for 2 hours; strain and press through calico; add the beeswax to the liquid; heat gently to dissolve; stir until cold." < Br.

UNGUENTUM STRAMONII. U. S. Stramonium Ointment.

Extract of Stramonium,	10 Gm. or 1 ounce
Diluted Alcohol,	5 Cc. or ½ ounce
Hydrous Wool-Fat,	20 Gm. or 2 ounces
Benzoinated Lard,	65 Gm. or 6½ ounces

The extract is to be rubbed with the diluted alcohol until uniformly soft, and then with the hydrous wool-fat and benzoinated lard gradually added, until they are thoroughly mixed. < U. S.

UNGUENTUM SULPHURIS. U. S., Br. Sulphur Ointment.

The U. S. P. formula is:

Washed Sulphur,	150 Gm. or 1½ ounces
Benzoinated Lard,	850 Gm. or 8½ ounces

The washed sulphur is to be rubbed with the benzoinated lard, gradually added, until they are thoroughly mixed. <U. S.

The Br. P. formula is:

Sublimed Sulphur, finely sifted,	30 Gm. or 1 ounce
Benzoated Lard,	270 Gm. or 9 ounces
Mix. <Br.	

UNGUENTUM SULPHURIS IODIDI. Br.**Sulphur Iodide Ointment.**

Sulphur Iodide,	2 Gm. or 20 grains
Glycerin,	2 Gm. or 20 grains
Benzoated Lard,	46 Gm. or 460 grains

"Triturate the sulphur iodide and glycerin in a slightly warmed mortar until a smooth paste results; gradually add the benzoated lard; stir until cold." <Br.

UNGUENTUM TARTARI STIBIATI. P. G.**Tartar Emetic Ointment. Brechweinsteinsalbe. G.**

Tartar Emetic, in fine powder,	2 parts
Paraffin Ointment,	8 parts
Mix them well together.	

UNGUENTUM TEREBINTHINÆ. P. G.**Turpentine Ointment. Terpentinsalbe. G.**

Turpentine, (Gum Thus),	1 part
Yellow Wax,	1 part
Oil of Turpentine,	1 part

Melt the solids and when cooling incorporate the oil of turpentine.

UNGUENTUM VERATRINÆ. U. S., Br. Veratrine Ointment.

Veratrine,	4 Gm. or 20 grains
Expressed Oil of Almond,	6 Gm. or 30 grains
Benzoinated Lard,	90 Gm. or 450 grains

The veratrine is to be rubbed with the oil in a mortar and, when dissolved, the benzoinated lard gradually added and mixed thoroughly. <U. S.

The Br. P. formula is:

Veratrine,	0.5 Gm. or 10 grains
Oleic Acid,	2.0 Gm. or 40 grains
Lard,	22.5 Gm. or 450 grains

"Rub the veratrine with the oleic acid and gently warm the mixture until dissolved; add the lard; mix." < Br.

This is an oleate of veratrine, reduced with lard, and is of the same percentage of strength as the U. S. Oleatum Veratrinæ, which see.

UNGUENTUM ZINCI OLEATIS. Br.

Zinc Oleate Ointment.

Zinc Sulphate, 60 Gm. or 2 ounces

Hard Soap, in shavings, 120 Gm. or 4 ounces

Distilled Water, boiling,

Soft Paraffin, white, of each, a sufficient quantity.

"Dissolve the zinc sulphate in 4 fl.ounces (or 120 Cc.) of the distilled water. Dissolve the hard soap in 40 fl.ounces (or 1200 Cc.) of the distilled water. Mix the solutions; collect the precipitated zinc oleate; wash with hot distilled water until the washings afford little or no reaction for sulphate; dry on a water-bath and mix with an equal quantity of the soft paraffin, melted; stir until cold." < Br.

UNGUENTUM ZINCI OXIDI. U. S. Ointment of Zinc Oxide.

Zinc Oxide, 200 Gm. or 2 ounces

Benzoinated Lard, 800 Gm. or 8 ounces

"Rub the zinc oxide, which must be free from gritty particles, with an equal weight of the melted benzoinated lard, and with this incorporate the remainder of the benzoinated lard, previously melted; if necessary, strain the ointment while warm and stir thoroughly until it congeals." < U. S.

Unguentum Zinci. Br. Zinc Ointment. Zinc oxide, finely sifted, 75 Gm. (or 3 ounces); benzoated lard 425 Gm. (or 17 ounces). Add the zinc oxide gradually to the benzoated lard, previously melted at a low temperature; stir the mixture occasionally until cold. < Br.

This is known as Unguentum Zinci in many of the European phar-

UNGUENTUM ZINCI STEARATIS. U. S.

Ointment of Zinc Stearate.

Zinc Stearate, in fine powder, 50 Gm. or 1 ounce

White Petrolatum, 50 Gm. or 1 ounce

To make 100 Gm. or 2 ounces

"To the white petrolatum, melted on a water-bath, add the zinc stearate. Continue the heat until the mixture becomes smooth, then stir while cooling until it congeals." < U. S.

OTHER OINTMENTS.

The foregoing official ointments include most of the ointments that are used to any extent in dispensing pharmacy, but some others have been official and are or have been used and are now occasionally called

for. It would be impracticable to give the detailed formulas for all of them, as the list of official ointments is already sufficient for the general uses of pharmacy and medicine, so only the more important ones for which there is some demand are mentioned and classified, showing their composition. They can be made in the same general way as is directed for similar official ointments. Solid drugs generally should be reduced to fine powder. Alkaloids should be rubbed with a few drops of alcohol, or better yet, with a little oleic acid, and dissolved by the aid of gentle heat before combining. Extracts should be slightly softened with alcohol or water. Ointment made with lard or with petrolatum may be used as a base, being generally preferable. Lard or petrolatum alone are sometimes used when softer ointments are desired.

Simple Ointments.

A great number of unofficial simple ointments are prepared from crude drugs, extracts, oils and chemical substances by combining them with an ointment base. They are so various, and so many, that no attempt to give specific formulas for them will be made here. In making the unofficial simple ointments those that are official will be sufficient guide, by comparing their percentage and the base with which the ointment is made with similar formulas official in the foregoing section.

Compound Ointments.

Of the great number of compound ointments known, a few are classed under this heading. Others will be found among the Standard Remedies and in other departments.

Alkaline Ointment. Sodium carbonate, (sal soda) 1 drachm, fresh slaked lime 30 grains, powdered opium 1 grain, lard or petrolatum 1 ounce. Mix them.

Alum Ointment Compound. Alum powder compound (composed of burnt alum 95 parts, powdered camphor 2 parts, carbolic acid 3 parts) 16 grains, ichthyol 16 grains, oil of red thyme 8 minims, zinc oxide 90 grains, benzoinated petrolatum 360 grains. Melt the benzoinated petrolatum and incorporate the other ingredients while cooling, mixing them thoroughly.

Antiperiodic Ointment. Quinine sulphate 90 grains, saccharated iron carbonate 60 grains, oil cajuput 30 drops, petrolatum or fresh butter 1 ounce. Mix.

Aromatic Ointment. Yellow wax, oil of laurel, expressed, each, 1 ounce; simple ointment 13 ounces. Melt them together and add when nearly cool, oil of juniper, peppermint, lavender and rosemary, each, 40 minims.

Astringent Ointment. The official ointment of galls and the lead ointments are often used as astringent ointments. The following is also used: Powdered catechu 90 grains, softened with boiling water 2 drachms, and mixed with spermaceti ointment or simple ointment 1 ounce, melted and stirred until it forms a mass. It may also be made from alum 1 ounce, catechu 3 ounces, both in very fine powder; added to olive oil 10 ounces, in which yellow resin 4 ounces, is melted, and stirred until cool.

Egg Ointment. Oil of almonds $1\frac{1}{2}$ ounces, beeswax $\frac{1}{2}$ ounce. Melt them together and, when cool but still fluid, add the yolk of 1 egg and 30 drops of balsam of Peru, and beat them thoroughly together.

Egyptian Ointment. Burnt alum 1 part, verdigris 10 parts, strong vinegar 14 parts, purified thick honey 32 parts. Mix them well together.

Juniper Tar Ointment. Lard and suet, each, 6 parts; beeswax 4 parts. Melt them together and, while cooling, add oil of juniper tar, (oil of cade) 16 parts, oil of lavender 1 part.

Labdanum Ointment. Labdanum 6 drachms, petrolatum 2 ounces, oil of mace 1 drachm, oil of wormwood 10 drops, balsam of Peru 2 drachms. Make an ointment.

Mayer's Ointment. Compound Lead Ointment, Amer. Disp. Olive oil $2\frac{1}{2}$ pounds, white pine turpentine $\frac{1}{2}$ pound, beeswax, unsalted butter, each, 4 ounces; red lead 1 pound, honey 12 ounces, powdered camphor 8 ounces. Melt the oil, turpentine, beeswax and butter together and strain, then heat nearly to boiling and gradually add the red lead, stirring the mixture constantly until it becomes brown or black, then remove from the fire and, when it becomes somewhat cool, add to it the honey and camphor, previously mixed together.

Nervine Ointment. Nervine Balsam. Expressed oil of mace, ox marrow, each, 4 ounces. Melt by gentle heat and add oil of rosemary 2 drachms, oil of cloves 1 drachm, camphor 1 drachm, balsam tolu 2 drachms (the last two dissolved in alcohol 4 drachms).

Pomade pour le Toucher or Obstetrical Ointment. Yellow wax, spermaceti, each, 1 ounce; olive oil 16 ounces. Melt together, strain, add solution of caustic soda 1 flounce, and stir until nearly cold.

Resorcinol Ointment Compound. Resorcinol 10 grains, carbolic acid 10 grains, oil cade 15 grains, subcarbonate of bismuth 30 grains, zinc oxide 60 grains. Rub the resorcinol and carbolic acid first with a portion of the melted ointment and while cooling add the other ingredients and the remainder of the ointment, mixing them thoroughly.

Stramonium Ointment Compound. (Beach's). Bittersweet bark or root, stramonium leaves, cicuta leaves, deadly nightshade, yellow dock root, each, 2 ounces; lard 1 pound, Venice turpentine 2 ounces. Bruise the roots and leaves, cover them with alcohol and digest with a moderate heat for four hours, then add the lard and continue the heat until the leaves are crisped. Lastly strain and express through linen, add the turpentine and stir constantly until cold. This is also called **Discutient Ointment**.

Unguentine. This is described by the manufacturers as an alum ointment containing also 2 percent. of carbolic acid and 5 percent. of ichthyol. It is employed as a general dressing in external inflammation.

Unguentum Credé. A 15% ointment of collargol or Argentinum Credé is employed by inunction and as an application against infection. It may readily be made by rubbing 72 grains of collargol with 410 grains of benzoinated petrolatum.

UREA. Carbamide.



This is a constituent of urine and is noted for being the first organic compound artificially produced. Artificial urea is employed in medicine. Its salts are sometimes employed as diuretics.

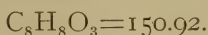
Nitrate of Urea. This may be prepared by saturating artificial urea with nitric acid, concentrating and crystallizing. The dose is from 2 to 5 grains as a diuretic, especially in dropsy. Other salts of urea may be prepared in the same manner.

Uric Acid. Lithic Acid. This occurs in the urine of certain animals and in morbid conditions of the kidneys. It is supposed to be the principal cause of acute rheumatic affections, gout etc., and is one of the most common constituents of urinary calculi.

Urethane. Ethyl Carbamide. This is a compound of ethyl and urea, in colorless crystals, soluble in water and alcohol. It is employed as a hypnotic, antispasmodic and sedative. The dose is from 30 to 75 grains.

Urophenin. Lithium Diuretin. This is similar to diuretin (sodium), except that lithium is used in place of sodium. It is a white powder, soluble in water, used as a diuretic in heart disease, nephritis etc. Dose 15 grains in solution.

Urotropin. A crystallizable salt, soluble in water and recommended as a uric acid solvent in doses of 7 to 10 grains. See Hexamethylenamina.

VANILLINUM. U. S. Vanillin.

"Methylprotocatechuic aldehyde [$\text{C}_6\text{H}_3\cdot\text{OH}\cdot\text{OCH}_3\cdot\text{COH}$ 4: 3: 1], occurring naturally in vanilla, or made artificially from several ortho-dihydro-benzene derivatives." <U. S.

Vanillin is the odorous crystalline principle of vanilla and is chemically the aldehyde of Methyl-protocatechuic Acid. It is also artificially prepared from the sap-wood or juice of pine trees, and from many other substances by complex processes. It is prepared and extensively sold for making extract of vanilla but the flavor of the product lacks the richness and delicacy of the true extract or tincture made from vanilla. It is also used in making perfumes etc.

Average dose.—0.030 Gm.=30 milligrammes ($\frac{1}{2}$ grain).

One ounce of vanillin and $\frac{1}{4}$ ounce coumarin, with $1\frac{1}{2}$ gallons of cologne spirit, $1\frac{1}{4}$ gallons of water, and $\frac{1}{2}$ gallon of syrup, colored with caramel produces a fair imitation of vanilla extract.

VAPORES — VAPORS.

Vapors were official in the 1885 Br. P., but were dismissed in the 1898 revision. They are solutions of medicinal substances which are volatilized by being passed through a suitable apparatus, and are intended to be used by inhalation. For the inhalation of different substances different kinds of apparatus are required. At the present time "Nebulizers" are considerable used for vaporizing and applying the vapors of many substances.

VALIDOL. Menthol Valerate.

A compound of menthly valerianate with 30 percent. of free menthol. It is a colorless thick liquid of mild, pleasant odor, having the cooling properties of menthol and the nerve sedative properties of valerian. It is used as a carminative and in hysteria and other forms of nerve irritation. Dose 10 to 20 drops in capsules.

Camphorated Validol. A solution of 10 percent. of camphor in validol. Used as a dental anodyne.

VALYL. Valeric Acid. Diethylamide.

This is a colorless liquid of peppermint-like odor and valerianic acid taste. It is soluble in about 25 parts of water and readily soluble in alcohol and ether. It is employed as a nervous sedative and antispasmodic in hysteria, palpitation etc. Dose 2 to 4 grains.

VERATRINA. U. S., Br. Veratrine.

"A mixture of alkaloids obtained from the seed of *Asagráea officinalis* (Schlechtendal et Chamisso) Lindley (Fam. Liliaceæ)." <U. S. It is soluble in 1750 parts of water, 2.2 parts of alcohol, 3 parts of ether and 1 part of chloroform at 25°C. (77°F.).

"An alkaloid or mixture of alkaloids prepared from Cevadilla, the dried ripe seeds of *Schoenocaulon officinale*, A. Gray." <Br.

The Br. P. gives the formula as follows:

Cevadilla of commerce, 2 pounds (or 1 kilogramme),
Distilled Water,
Alcohol, (90%),
Solution of Ammonia,
Hydrochloric acid, of each, a sufficient quantity.

"Macerate the cevadilla with half its weight of boiling distilled water in a covered vessel for 24 hours; remove the cevadilla; squeeze it; dry it thoroughly in a warm place; then beat it in a mortar, then separate the seeds from the capsules. Reduce the seeds to powder, moisten with alcohol; pack firmly in a percolator; pass the alcohol through the marc until the percolate ceases to be colored; concentrate the alcoholic solution by distillation so long as no deposit forms, and pour the residue, while hot, into 12 times its volume of cold distilled water; filter through calico; wash what remains on the filter with cold distilled water until the filtrate ceases to precipitate with solution of ammonia. To the filtrate add solution of ammonia in slight excess; let the precipitate completely subside; pour off the supernatant liquid; collect the precipitate on a filter; wash it with distilled water until the filtrate passes colorless; distribute the moist precipitate through 12 fl.ounces (or 400 Cc.) of distilled water; add gradually, with diligent stirring, sufficient hydrochloric acid to make the liquid feebly but persistently acid; add 60 grains (or 4 grammes) of the purified animal charcoal of commerce; digest with moderate heat for 20 minutes; filter; allow the liquid to cool; add solution of ammonia in slight excess, and, when the precipitate has completely subsided, pour off the supernatant liquid; collect the precipitate on a filter and wash it with cold distilled water until free from chloride; dry the precipitate, first by imbibition with filtering paper, then by the application of warmth."

"This is pale gray, amorphous, without odor, but even in the most minute quantity powerfully irritating to the nostrils; it is strongly and persistently bitter and acid. It is insoluble in water, soluble in 3 parts of alcohol (90%), or of chloroform, in 6 parts of ether, and in diluted acids, leaving slight traces of a brown resinous matter. Heated with access of air veratrine melts to a yellow liquid, and at length burns away, leaving no appreciable residue (absence of mineral impurity)." <Br.

This substance, according to reliable authorities, consists of three alkaloids; cevadine, $C_{33}H_{49}NO_9$; veratrine, $C_{37}H_{53}NO_{11}$; and cevadilline, $C_{34}H_{53}NO_8$.

Average dose.—0.002 Gm.=2 milligrammes ($\frac{1}{30}$ grain).

Veratrine Sulphate. This salt is prepared by adding to dilute sulphuric acid veratrine alkaloid until the acid is neutralized, then concentrating by evaporation and crystallizing. This salt, being soluble, is used almost altogether in place of the alkaloid in the treatment of neuralgia, epilepsy, gout and rheumatism. The dose is $\frac{1}{60}$ to $\frac{1}{20}$ grain. An ointment and oleate are prepared from the alkaloids, 1 to 4 percent., and are used for applications to rheumatic swellings and stiff joints. A solution in alcohol, combined with volatile oil of mustard is used as an application for neuralgia.

VERONAL. Diethylmalonylurea. Diethylbarbituric Acid.

This is a white crystalline powder soluble in about 150 parts of water, but more soluble in alcohol. It is now considerably used as a hypnotic and nerve sedative for insomnia and excitation not caused by pain, but by nervous irritability. The dose is 5 to 15 grains in hot water or tea.

Veronal-Sodium. The sodium salt of the above acid, soluble in 5 parts of water; uses and doses the same as above.

VINA — WINES.

As considered in pharmacy, wines are the natural product of the fermentation of fruit juices, or liquid medicinal preparations in which wine is chiefly used as the menstruum or vehicle for holding the medicinal principles in solution. The medicinal wines are similar to, but generally weaker than tinctures.

The basis of the medicinal wines is the fermented juice of different varieties of grapes—the light-colored varieties being known in U. S. pharmacy as *Vinum Album*, or White Wine; and the dark varieties being known as *Vinum Rubrum*, or Red Wine. In other pharmacopœias specific varieties of wines are directed, as *Vinum Xercium*, (Sherry Wine); *Vinum Oporto*, (Port Wine) etc.

The following are the official wines of the U. S. and Br. Pharmacopœias:

VINUM ALBUM. U. S. White Wine.

“An alcoholic liquid made by fermenting the juice of fresh grapes, the fruit of *Vitis Vinifera*, Linné (Fam. Vitaceæ), freed from seeds, stems and skins, and subjected to the usual cellar-treatment for fining and aging.” <U. S.

White wines of domestic production, as California Riesling, Ohio Catawba etc., are recommended. The wine should not contain less than 10 percent., nor more than 14 percent., by weight, (equivalent to 12.4 to 17.3 percent., by volume), of absolute alcohol. It may be stated that most natural, domestic wines made in this country do not contain this amount of alcohol, but are fortified by sugar when fer-

mented, or by adding alcohol, when put upon the market, to bring them up to the standard of alcoholic percentage.

VINUM ANTIMONII. U. S. Wine of Antimony.

Antimony and Potassium Tartrate, 4 Gm. or 62 grains
Boiling Distilled Water, 65 Cc. or $2\frac{1}{4}$ fl.ounces
Alcohol, 175 Cc. or 6 fl.ounces
White Wine, sufficient to make 1000 Cc. or 34 fl.ounces

The alcohol is to be mixed with 800 Cc. (or 27 fl.ounces) of white wine. The tartar emetic is to be dissolved in the boiling distilled water and the solution added to the mixture. When the liquid is cold it is to be filtered through paper and enough white wine added through the filter to make the measure 1000 Cc. (or 34 fl.ounces). <U. S.

Average dose.—1 Cc. (15 minims).

Vinum Antimoniale. Br. Antimonial Wine. Tartarated antimony 4 Gm. (or 40 grains), distilled water, boiling, 44 Cc. (or 1 fl.ounce); sherry, a sufficient quantity. Dissolve the tartarated antimony in the distilled water; mix the solution with sufficient sherry wine to form 875 Cc. (or 20 fl.ounces) of the antimonial wine. Dose, 10 to 30 minims. As an emetic, 2 to 4 fl.drachms.

VINUM AROMATICUM. Aromatic Wine.

This was formerly official in the U. S. P., but was dismissed. It is now official in most of the European pharmacopœias.

Lavender, organum, peppermint, rosemary, sage, wormwood, each, 1 part (or 72 grains); white wine, sufficient to make 100 parts (or a pint).

Mix the solid ingredients and reduce them to a coarse powder moisten the powder with a fl.ounce of stronger white wine, pack it moderately in a conical glass percolator and gradually pour enough stronger white wine upon it to make the filtered liquid measure a pint.

VINUM AURANTII. Br. Orange Wine.

Wine made by the fermentation of a saccharine solution to which the fresh peel of the bitter orange has been added. <Br.

This official Br. wine is simply a wine flavored with orange, and it seems unnecessary to be to so much trouble to prepare it. It may be readily prepared by adding a sufficient quantity of tincture of fresh orange peel or a solution of oil of bitter orange in alcohol to sherry or other white wine.

Orange wine is used for making flavored medicinal wines.

Vinum Aurantii Detannatum. B. P. C. Detannated Orange Wine. Orange wine 1 gallon (Imp. measure), gelatin, cut small, $\frac{1}{4}$ ounce. Macerate for 14 days and decant.

VINUM CAMPHORATUM. P. G. Wine of Camphor.

Camphor,	1 part
Alcohol,	1 part
Mucilage of Acacia,	3 parts
White Wine,	45 parts

Dissolve the camphor by rubbing with the alcohol, and gradually add the remaining ingredients. By using water instead of wine this may be dispensed as Camphor Julep, when wanted.

VINUM CHINÆ. P. G. Wine of Quinine. Chinawein. G.

White Glue,	1 part
Water,	10 parts
Sherry Wine,	1000 parts
Calisaya Bark, coarse powder,	40 parts
Powdered Sugar,	100 parts
Tincture of Orange,	2 parts

Dissolve the glue in the water by the aid of heat. Mix the warm solution with the wine, and, after adding the calisaya, let the mixture stand for 8 days at a temperature of from 15° to 20°C. Express, add the sugar and orange tincture to the expressed liquid and let stand for 14 days in a cool place, and filter.

VINUM COCÆ. U. S. Wine of Coca.

Fluidextract of Coca,	65 Cc. or 2¼ fl.ounces
Alcohol,	75 Cc. or 2⅝ fl.ounces
Sugar,	65 Gm. or 2¼ ounces
Red Wine, a sufficient quantity	

To make 1000 Cc. or 34 fl.ounces

The sugar is to be dissolved in 500 Cc. (or 17 fl.ounces) of red wine, the alcohol and fluidextract of coca added, and enough red wine to make the measure 1000 Cc. (or 34 fl.ounces). It is then to be set aside for 2 days, and filtered through paper in a well-covered funnel. <U. S.

This wine has had an extensive sale as a proprietary preparation, and is now considerably prescribed by physicians.

Average dose.—16 Cc. (4 fl.drachms).

VINUM COLCHICI. Br. Colchicum Wine.

Colchicum Corm, No. 40 powder,	200 Gm. or 4 ounces
Sherry,	1000 Cc. or 20 fl.ounces

Macerate as directed for tincture. Dose, 10 to 30 minims. <Br.

As this is the only official wine of colchicum in the Br. P., it should always be dispensed when wine of colchicum is called for or prescribed in Br. formulas, but in the U. S. wine of colchicum seed should be dispensed.

VINUM COLCHICI SEMINIS. U. S. Wine of Colchicum Seed.

Fluidextract of Colchicum Seed,	100 Cc. or 2 fl.ounces
Alcohol,	150 Cc. or 3 fl.ounces
White Wine,	750 Cc. or 15 fl.ounces
To make	1000 Cc. or 20 fl.ounces

"Mix them, set the mixture aside for 2 days; then filter through paper in a well-covered funnel." <U. S.

Average dose.—2 Cc. (30 minims).

VINUM CONDURANGO. P. G. Condurango Wine.

Condurango Bark, in coarse powder,	1 part
Sherry Wine,	10 parts
Macerate for 8 days in a warm place; press out the liquid; filter.	

VINUM ERGOTÆ. U. S. Wine of Ergot.

Fluidextract of Ergot,	200 Cc. or 4 fl.ounces
Alcohol,	50 Cc. or 1 fl.ounce
White Wine,	750 Cc. or 15 fl.ounces
To make	1000 Cc. or 20 fl.ounces

"Mix them. Set the mixture aside for 2 days; then filter through paper, in a well-covered funnel." <U. S.

Average dose.—8 Cc. (2 fl.ounces).

VINUM FERRI. U. S. Wine of Iron.

[Vinum Ferri Citratis, Pharm. 1890].

Iron and Ammonium Citrate,	40 Gm. or 1 ounce av.
Tincture of Sweet Orange Peel,	60 Cc. or 1½ fl.ounces
Syrup,	100 Cc. or 2½ fl.ounces
White Wine, sufficient to make	1000 Cc. or 25 fl.ounces

"Dissolve the iron and ammonium citrate in 700 Cc. (or 17½ fl.ounces) of white wine, add this to the tincture of sweet orange peel and the syrup, and lastly enough white wine to make 1000 Cc. (or 25 fl.ounces). Set the mixture aside for 2 days; then filter through paper, in a well-covered funnel." <U. S.

Average dose.—8 Cc. (2 fl.drachms).

The Br. P. formula having the same title is:

Iron, in wire,	50 Gm. or 1 ounce
Sherry,	1000 Cc. or 20 fl.ounces

"Set aside for 30 days in a closed vessel, the iron wire being almost, but not quite immersed in the sherry, the vessel being frequently shaken and the stopper occasionally removed; filter. Dose, 1 to 4 fl.drachms." <Br.

VINUM FERRI AMARUM. U. S. Bitter Wine of Iron.

Soluble Iron and Quinine Citrate,	50 Gm. or 772 grains
Tincture of Sweet Orange Peel,	60 Cc. or 2 fl.ounces
Syrup,	300 Cc. or 10 fl.ounces
White Wine, sufficient to make	1000 Cc. or 34 fl.ounces

"Dissolve the soluble iron and quinine citrate in 500 Cc. (or 17 fl.ounces) of the white wine. Add to this the tincture of sweet orange peel and the syrup, and lastly enough white wine to make the product measure 1000 Cc. (or 34 fl.ounces). Set the mixture aside for 2 days; then filter through paper, in a well-covered funnel." <U. S.

Average dose.—8 Cc. (2 fl.drachms).

This is unlike the bitter wine of iron furnished by manufacturers, being much stronger of both iron and quinine.

VINUM FERRI CITRATIS. Br. Wine of Iron Citrate.

The U. S. P. formula which was formerly represented by this title is now under Vinum Ferri, which see.

The Br. P. formula is:

Iron and Ammonium Citrate,	18.3 Gm. or 160 grains
Orange Wine, a sufficient quantity.	

"Dissolve the iron and ammonium citrate in sufficient orange wine to form 20 fl.ounces (or 1000 Cc.). Agitate occasionally for 3 days; filter. Dose, 1 to 4 fl.drachms." <Br.

Other soluble salts of iron that are not precipitated by the acid of the wine may be used.

VINUM IPECACUANHÆ. U. S., Br. Wine of Ipecac.

The U. S. P. formula is:

Fluidextract of Ipecac,	100 Cc. or 1 fl.ounce
Alcohol,	100 Cc. or 1 fl.ounce
White Wine,	800 Cc. or 8 fl.ounces

They are to be mixed and set aside for 2 days; then filtered through paper in a well-covered funnel. <U. S.

The Br. P. formula is:

Liquid Extract of Ipecac,	50 Cc. or 1 fl.ounce
Sherry,	950 Cc. or 19 fl.ounces

Mix; set aside for 48 hours; filter. Dose, 1 to 4 fl.drachms. <Br.

The P. G. directs 1 part of ipecac to be macerated with 10 parts of sherry wine during 8 days; then pressed and the liquid filtered.

The dose is from 5 to 10 minims, as an expectorant; and from 1 to 3 fl.drachms as an emetic.

VINUM OPII. U. S. Wine of Opium.

Granulated Opium,	100 Gm. or 912 grains
Saigon Cinnamon, No. 60 powder,	10 Gm. or 91 grains

Cloves, No. 30 powder, 10 Gm. or 91 grains
Alcohol,
White Wine, each, sufficient

To make 1000 Cc. or 20 fl.ounces

"Mix 150 Cc. (or 3 fl.ounces) of alcohol and 850 Cc. (or 17 fl.ounces) of white wine as a menstruum. Macerate the opium and spices in a stoppered container, in a moderately warm place, with 750 Cc. (or 15 fl.ounces) of this menstruum during 7 days, with occasional agitation; then filter through purified cotton, in a well-covered funnel, returning the first portions until the filtrate passes perfectly clear, and finally pass enough menstruum through the residue to make the liquid measure 1000 Cc. (or 20 fl.ounces)." < U. S.

Average dose.—0.5 Cc. (8 minims).

VINUM PEPSINI. P. G. Wine of Pepsin. Pepsinwein. G.

Pepsin,	24 parts
Glycerin,	20 parts
Muriatic Acid,	3 parts
Water,	20 parts
White Syrup,	92 parts
Orange Tincture,	2 parts
Sherry Wine,	839 parts

Thoroughly mix the pepsin with the glycerin, acid and water, and let stand 24 hours, with frequent agitation; then add the syrup, orange tincture and wine. Filter after standing and add sufficient sherry wine through the filter to bring the measure up to 1000 parts.

The B. P. C., 1901, formula is:

Pepsin,	320 grains
Hydrochloric Acid,	2 fl.drachms
Glycerin,	1 fl.ounce
Sherry, to produce	20 fl.ounces

Add the acid to 18 fl.ounces of the sherry. Rub in a mortar the pepsin with the glycerin, and gradually add the mixed sherry and acid, with constant stirring. Set aside for a week, filter, and add sufficient sherry to produce 20 fl.ounces. Dose, 1 to 2 fl.drachms.

As scale pepsin is now almost universally used for making liquid pepsin preparations, the following formula is given: Scale pepsin 128 grains, glycerin 2 ounces, prepared wine 13 ounces, prepared flavoring 1 ounce. Mix the liquids, add the pepsin, allow to stand a few days with occasional agitation, and decant the clear liquid.

VINUM QUININÆ. Br. Wine of Quinine.

Quinine Hydrochloride,	2 Gm. or 20 grains
Orange Wine,	875 Cc. or 20 fl.ounces

Dissolve the quinine salt in the wine, allow the solution to remain for 3 days in a closed vessel, shaking it occasionally, and afterwards filter.

A flounce contains 1 grain of quinine. Dose, 1 to 2 tablespoonfuls.

Quinine Wine, Improved. Quinine hydrochloride 64 grains, sugar 3 ounces, prepared wine 14 ounces, prepared flavoring 1 ounce. Mix the quinine and prepared flavoring, add the wine and sugar, dissolve.

VINUM RUBRUM. U. S. Red Wine.

"An alcoholic liquid, made by fermenting the juice of fresh red-colored grapes, the fruit of *Vitis Vinifera*, Linné (Fam. Vitaceæ), in the presence of their skins." <U. S.

The present pharmacopœia contemplates that a natural domestic red wine, without the addition of sugar, as claret, Burgundy etc., shall be used, unless otherwise specified. It should contain not less than 10 nor more than 14 percent., by weight, (equivalent to 12.4 to 17.3 percent., by volume) of absolute alcohol.

VINUM XERICUM. Br. Sherry.

This is a light-colored Spanish wine, which was formerly directed to be used in the U. S. P., and is still directed in the Br. P. It contains a larger percentage of alcohol than most wines, about 17 percent. being the average.

Other varieties of wine are also used for making the official preparations, the California and native wines being considerably used. It is only required that they contain sufficient alcohol to keep the preparations and to be as free from astringent properties as may be.

Vinum Xericum Detannatum. B. P. C. Detannated Sherry. Sherry 1 gallon, (Imp. measure); gelatin, cut small, $\frac{1}{4}$ ounce. Macerate for 14 days and decant.

Other Medicinal Wines.

The foregoing wines are those official in the leading pharmacopœias, but besides these are many unofficial medicinal wines which are considerably used, the important among these being known as "elegant preparations." They are, therefore, given about the same prominence as the official wines.

Prepared Wine.

For making medicinal wines, containing organic salts or principles, or salts of iron, it is necessary to use a wine which is free from tannin or astringent principles which will cause discolorization or precipitation. Many of the wines, also, have not sufficient alcoholic strength to keep the preparations in which they are combined, and it is necessary to add more alcohol to them.

In making the following wines, therefore, it is expedient to have a prepared wine which corresponds with these requirements, as follows:

White Wine, Sherry or Native,	7 pints
White of Egg,	2 fl.drachms
Alcohol,	1 pint
Solution of Saccharin,	4 fl.drachms

Beat the white of egg to a froth and mix it thoroughly with the wine, heat to about 170°F., or until the albumen is coagulated, then cool, add the alcohol and after standing for 8 days, filter clear through paper, and add the solution of saccharin.

This serves as a basis for all the medicinal wines which follow, and may, with advantage, be used in the official wines in place of the white wine directed.

If a red wine is desired as the basis of a preparation use double the quantity of white of egg as the formula directs, and proceed in the same manner.

Aromatic Wine.

Cinnamon, in fine powder,	1 ounce av.
Nutmeg, in fine powder,	1 ounce av.
Cloves, in fine powder,	1 ounce av.
Soluble Flavoring,	2 fl.ounces
Prepared Wine,	2 pints

Macerate for 14 days and filter. Dose, a tablespoonful.

Wine of Beef.

Liebig's Extract of Meat,	1 ounce av.
Elixir,	4 fl.ounces
Prepared Wine,	12 fl.ounces

Rub the extract of meat with the elixir and add the wine. After standing a few days, filter.

A tablespoonful, which is the usual dose, represents 1 ounce of fresh beef.

This preparation is really much more desirable than the popular Wine of Beef and Iron, as the iron is better in some other combinations than with the beef. See remarks after Wine of Beef and Iron.

Wine of Beef and Iron.

Liebig's Extract of Meat,	½ ounce av.
Soluble Iron Phosphate, in scales,	64 grains
(Other Soluble Salts of Iron may be used).	
Elixir,	4 fl.ounces
Prepared Wine,	12 fl.ounces

Rub the extract of meat with the elixir, dissolve the iron salt in about ½ fl.ounce of hot water and add to the wine, then mix the wine with the mixture of beef etc., and set aside, agitating occasionally, for several weeks, then filter.

A tablespoonful represents ½ ounce of fresh beef and 2 grains of the iron salt.

In this preparation an action between the salts which are contained in the meat extract, the acid of the wine, and the soluble salt of iron which is used, continues to take place for some time after the preparation is made, resulting in the reduction of a portion of the iron salt to an insoluble salt, (mainly ferric oxide). This cannot be avoided in the preparation except by the introduction of undesirable agents, and the only way to make a satisfactory wine of beef and iron is to let it stand until the action is completed, before filtering it, for, if filtered when freshly made, it will soon precipitate and continue to do so after repeated filtrations, unless allowed to stand at least four weeks after being made, when it should be filtered.

Wine of Beef, Iron and Cinchona.

Quinine Sulphate,	5 grains
Cinchonidine Sulphate,	10 grains
Wine of Beef and Iron,	1 pint

Rub the sulphates with a portion of the wine of beef and iron, add the remainder, and, after standing, filter.

A dessertspoonful of this preparation represents about 10 grains of cinchona in addition to the wine of beef and iron.

Bitter Wine of Iron. Wine of Cinchona and Iron.

The formula for this preparation is now official in the U. S. P., and is given with suggestions etc., under the title *Vinum Ferri Amara*. It may be added here, however, that any soluble salt of iron may be used, and an equivalent quantity of the salts of cinchona added.

We give the following formula which will probably give better general satisfaction than those mentioned:

Quinine Sulphate,	60 grains
Cinchonidine Sulphate,	90 grains
Soluble Iron Phosphate, in scales,	2 ounces av.
Elixir,	1 $\frac{3}{4}$ pints
Prepared Wine,	6 pints
Water,	$\frac{1}{4}$ pint

Rub the sulphates with the elixir and add the prepared wine, dissolve the iron salt in the water by the aid of heat and add the solution of quinine etc., gradually to the solution of iron, with constant stirring, until they are thoroughly mixed, and filter if necessary.

As thus prepared it will be a light, greenish-colored preparation. It may be colored dark with caramel, or reddish-brown with caramel and cochineal red.

If iron and ammonium citrate is used instead of the soluble phosphate, it imparts the desired color, but it is more liable to precipitate after standing. It may be more highly flavored, if desired, by adding soluble flavoring.

This preparation represents in a dessertspoonful, the usual dose, about 10 grains of cinchona and 2 grains of the iron salt.

Wine of Calisaya or Cinchona.

Quinine Sulphate,	60 grains
Cinchonidine Sulphate,	90 grains
Elixir,	2 pints
Prepared Wine,	6 pints

Mix the wine and elixir, rub the sulphates first with a portion of the mixture, then add the remainder and color as desired with caramel and cochineal.

A dessertspoonful, the usual dose, represents about 10 grains of cinchona or calisaya bark.

This may be prepared from the bark, if desired, by percolating $1\frac{1}{3}$ ounces of the bark with the mixture of elixir and wine sufficient to make a pint of the preparation. Also by mixing $1\frac{1}{3}$ fl.ounces of fluid-extract of calisaya or cinchona, either plain or detannated, with enough of the mixed wine and elixir to make a pint.

The preparation made from the salts is, however, generally preferred, and is much less trouble to make than from the bark.

Wine of Calisaya, Iron and Strychnine.

Strychnine Sulphate,	$1\frac{1}{4}$ grains
Bitter Wine of Iron,	1 pint

Dissolve the strychnine salt by rubbing with separate portions of the bitter wine of iron, or use solution of strychnine $1\frac{1}{4}$ fl.drachm, instead of the salt.

A fl.drachm contains $\frac{1}{100}$ grain of strychnine combined with bitter wine of iron.

Wine of Cascara Sagrada.

Fluidextract of Cascara, "Bitterless,"	$1\frac{1}{2}$ ounces
Sugar,	$1\frac{1}{2}$ ounces
Prepared Wine,	28 ounces

Mix, set aside for a few days, and filter. Dose, 1 or 2 tablespoonfuls.

Wine of Coca or Erythroxyton.

Coca Leaves, in coarse powder,	3 ounces av.
Elixir,	6 fl.ounces
Prepared Wine,	12 fl.ounces

Percolate the drug with the mixed wine and elixir until 1 pint is obtained.

This may also be made by mixing 3 fl.ounces of fluidextract of coca with a mixture of 2 parts of prepared wine and 1 part of elixir sufficient to make a pint.

The dose is a teaspoonful or more.

A wine of coca of less strength is popular as a beverage in place of ordinary wine. Such a wine may be made with port wine 4 pints, claret wine 4 pints, sugar 1 pound, fluidextract coca 1½ ounces.

Wine of Coca with Beef.

Liebig's Extract of Beef,	6 ounces av.
Wine of Coca,	1 gallon

Let stand three or four days, and filter.

A fl.ounce represents about $\frac{2}{3}$ ounce lean beef.

Other formulas for wines of coca will be found among the Standard Remedies.

Wine of Cotton Root or Gossypium.

This is most readily prepared from the fluidextract as follows:

Fluidextract of Cotton Root,	4 fl.ounces
Prepared Wine,	8 fl.ounces
Elixir,	4 fl.ounces

Mix them. As a portion of the constituents of cotton root are insoluble except in alcohol, a precipitate forms, and the preparation must be filtered.

This is given in doses of 1 to 4 fl.drachms as a uterine tonic.

Wine of Damiana or Turneria.

Fluidextract of Damiana,	3 fl.ounces
Prepared Wine,	10 fl.ounces
Elixir,	3 fl.ounces

Mix them, and after standing, filter.

The dose is 1 to 4 fl.drachms as a diuretic and aphrodisiac.

Wine of Iron.

This may be prepared from any of the soluble salts of iron. The following will give the best satisfaction: A preparation bearing this name is now official in the U. S. P.

Soluble Iron Phosphate, in scales,	256 grains
Elixir,	5 fl.ounces
Prepared Wine,	10 fl.ounces
Water,	$\frac{3}{4}$ fl.ounce

Dissolve the iron salt in the water by the aid of heat and add to the solution, first the elixir, then the wine, and, after standing, filter if necessary.

A fl.drachm contains 2 grains of the iron salt. The dose is a teaspoonful or more.

Wine of Pancreatin.

Powdered Pancreatin,	160 grains
Elixir,	4 fl.ounces
Prepared Wine,	12 fl.ounces
Soluble Flavoring,	$\frac{1}{2}$ fl.ounce

Mix them and macerate for several days with occasional agitation, then strain through muslin or filter through coarse paper.

This may also be prepared by macerating fresh pancreas of the pig, chopped fine, with a mixture of prepared wine and elixir, in the same proportion as above, using 1 pint of the mixture to half a pound of the chopped pancreas.

A tablespoonful of the wine represents 5 grains of pancreatin. The dose is a dessertspoonful to a tablespoonful.

Wine of Pepsin.

The formula for wine of pepsin is given among the official preparations, but the product prepared from it does not correspond with that usually found on the market by that name, which may be made as follows:

Pepsin, in scales,	256 grains
Hydrochloric Acid,	30 minims
Distilled Water,	1 fl.ounce
Prepared Wine,	15 fl.ounces

Rub the pepsin to a coarse powder and macerate with the water until it softens to a gelatinous mass, then add the hydrochloric acid and prepared wine, and agitate occasionally until the pepsin is dissolved, and strain through muslin. Do not filter. This is the most effective wine of pepsin, but, as it is not sweetened or flavored, it is not so pleasant as the following:

Saccharated Pepsin,	250 grains
Elixir,	4 fl.ounces
Soluble Flavoring,	$\frac{1}{2}$ fl.ounce
Prepared Wine,	12 fl.ounces

Mix and macerate, with occasional agitation, for several days, then strain or filter through coarse paper.

Wine of pepsin may also be made by macerating the freshly dissected inner coating of the pig's stomach with prepared wine. When thus made there is no very definite strength to the preparation, but the general rule is to use one stomach to make a pint of the preparation.

The dose of wine of pepsin is from a teaspoonful to a tablespoonful.

Combinations of wine of pepsin with bismuth are advertised by manufacturers, but they cannot be prepared except by neutralizing the wine which is used, and the elixirs of pepsin and bismuth are more desirable.

Wine of Pepsin and Iron.

Soluble Iron Phosphate, in scales,	128 grains
Wine of Pepsin,	1 pint

Dissolve the iron salt in $\frac{1}{2}$ fl.ounce of water and add to the wine of pepsin. A dessertspoonful contains 2 grains of the iron salt.

Wine of Tar.

Pine Tar,	1 ounce av.
Pine Sawdust,	2 ounces av.
Elixir,	4 fl.ounces
Prepared Wine, sufficient to make	1 pint

Rub the tar in a mortar with pine sawdust, mix the elixir with 12 fl.ounces of the prepared wine and rub with the tar etc., in a mortar, filter and add through the filter sufficient prepared wine to make 1 pint.

Vitalized Wine.

Phosphorus,	$\frac{1}{6}$ grain
Absolute Alcohol,	1 fl.ounce
Soluble Phosphate of Iron,	64 grains
Glycerin,	1 fl.ounce
Prepared Wine,	14 fl.ounces

Dissolve the phosphorus in the absolute alcohol by means of a water-bath, add the glycerin, then the wine, dissolve the iron salt in $\frac{1}{2}$ fl.ounce of water and add to the solution.

The dose is a dessertspoonful to a tablespoonful.

Wine of Wild Cherry.

Fluidextract of Wild Cherry,	2 fl.ounces
Glycerin,	1 fl.ounce
Elixir,	4 fl.ounces
Prepared Wine, sufficient to make	1 pint

Mix them and, after standing 24 hours, filter.

This may also be prepared by percolating the bark with the liquids, or by crushing 2 ounces of wild cherry pits and macerating with the mixture of elixir, wine etc., sufficient to make a pint.

The dose is a dessertspoonful.

Wine of Wild Cherry and Iron.

As the wine of wild cherry prepared from the bark contains considerable astringent or tannin, it will not combine with iron without making an inky mixture, except it is detannated, which may be done as directed for detannating elixirs. The preparation may then be made as follows:

Wine of Wild Cherry, detannated,	1 pint
Soluble Iron Phosphate, in scales,	128 grains

Dissolve the iron in $\frac{1}{2}$ fl.ounce of hot water and add to the wine.

As the detannated wine of wild cherry contains little else of the medicinal properties of the bark except the hydrocyanic acid and flavoring ingredients, a preparation which answers the purpose may be made from the following formula:

Oil of Cherry Laurel Leaves,	15 minims
Hydrocyanic Acid, diluted, U. S.,	30 minims
Soluble Iron Phosphate, in scales,	128 grains
Glycerin,	1 fl.ounce
Elixir,	4 fl.ounces
Prepared Wine, to make	1 pint

Dissolve the iron salt in $\frac{1}{2}$ fl.ounce of hot water and add to the mixed wine, glycerin and elixir, then add the acid and oil, mixing them thoroughly, color with caramel and, after standing a few days, filter. Other soluble salts of iron may be used instead of the phosphate.

XEROFORM. Bismuth Tribromphenate.

A yellow powder containing 50 percent. of bismuth oxide, insoluble in ordinary solvents. It is used externally as an antiseptic and drying application, and internally in doses of 10 to 15 grains.

ZINCUM. U. S. Zinc.

Symbol Zn; Atomic weight ($H=1$) 69.4; Sp. gr. 6.8 to 7.2.

This elementary metal was known to the ancient metal-workers, but was first introduced to notice by Paracelsus in the 16th century. It is obtained by roasting its ores from which it is volatilized, its vapor being collected in suitable receivers under water. It is a bluish-white metal, tough and ductile when cold, brittle and easily pulverized when heated to about 400°F. It fuses at 773°F., and burns with a bright green flame when heated to 941°F. in contact with the air. It is grouped with aluminum, cerium and cadmium, as it resembles these in physical properties. In the arts it is one of the most important metals, being extensively used in the manufacture of a great variety of useful and ornamental articles, and, combined with copper, forming brass and other alloys, which are of great importance. In pharmacy zinc is the source of several important salts which are used in medicine and for other purposes.

Zinc and its compounds are more fully noted in the Chemical Section of this work, Part I.

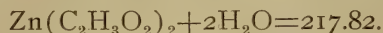
Zincum Granulatum. Granulated Zinc.

This may be made from zinc of commerce 1 pound, by heating it in an earthenware crucible, and immediately, when the metal is fused, removing the crucible from the fire and pouring the metal in a thin stream into a vessel containing about 2 gallons of cold water. Drain off the water and dry the granulated zinc.

Granulated zinc is the most convenient form of metallic zinc for chemical or pharmaceutical purposes.

The official salts of zinc are as follows:

ZINCI ACETAS. U. S., Br. Zinc Acetate. White Vitriol.



"It should contain in the uneffloresced condition not less than 99.5 percent. of Zinc Acetate $[(\text{CH}_3\text{COO})_2\text{Zn} + 2\text{H}_2\text{O}]$, and should be kept in well-stoppered bottles." <U. S.

"Zinc Acetate is prepared by neutralizing acetic acid with zinc carbonate." <Br.

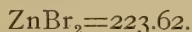
Preparation. This is official in nearly all countries. The Br. 1885 formula was:

Carbonate of Zinc,	2 ounces av.
Acetic Acid, a sufficiency, or	5 fl.ounces
Distilled Water,	6 fl.ounces

Add the carbonate of zinc, in successive portions, to 3 ounces of the acetic acid, previously mixed with the water in a flask, heat gently, add by degrees the remainder of the acid until the carbonate is dissolved, boil for a few minutes, filter while hot and set it aside for 2 days to crystallize. The crystals may be removed and more obtained by concentrating the liquid. The crystals are drained and dried on porous tiles.

Uses. This salt is used for injections and washes, and is given as a tonic in doses of 1 to 2 grains, and as an emetic in doses of 10 to 20 grains.

ZINCI BROMIDUM. U. S. Zinc Bromide.



"It should contain, when anhydrous, at least 97 percent. of pure Zinc Bromide, and should be kept in small, glass-stoppered bottles." <U. S.

Preparation. The formula for this salt is not given in the U. S. P., but it may be made by double decomposition between potassium bromide and zinc sulphate, as follows:

Potassium Bromide,	1000 parts or grains
Zinc Sulphate,	240 parts or grains

Dissolve them each separately in the smallest requisite quantity of hot water and mix the solutions while hot, when the mixture is cool, add twice its volume of alcohol, filter through asbestos to separate the potassium sulphate, which is precipitated, and evaporate the filtered liquid to dryness and granulation.

Uses. This salt of zinc is given as a hypnotic in doses of 5 grains.

Average dose.—0.125 Gm.=125 milligrammes (2 grains).

ZINCI CARBONAS PRÆCIPITATUS. U. S.**Precipitated Zinc Carbonate. U. S. Zinc Carbonate. Br.**

"Hydrated Zinc Carbonate, which, upon ignition should yield not less than 72 percent. of zinc oxide, $\text{ZnO}=80.78$." < U. S.

"Zinc Carbonate or zinc hydrocarbonate, $\text{ZnCO}_3(\text{ZnH}_2\text{O}_2)\text{H}_2\text{O}$, is produced by the interaction of zinc sulphate and sodium carbonate." < Br.

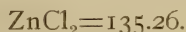
Impure carbonate of zinc is known as Calamine, and is frequently directed in older pharmaceutical works; but the precipitated salt is now generally used in medicine.

Preparation. The U. S. P. gives no formula for precipitated zinc carbonate, but the Br. P. directed:

Zinc Sulphate,	10 ounces av.
Sodium Carbonate,	10½ ounces av.
Boiling Distilled Water, a sufficiency.	

Dissolve the sodium carbonate in a pint of water in a capacious porcelain vessel and pour into it a solution of the zinc sulphate, in 20 fl.ounces of the water, stirring diligently; boil for 15 minutes after effervescence has ceased, and let the precipitate subside, decant the supernatant liquid, pour on the precipitate 60 fl.ounces of boiling distilled water, agitating briskly; let the precipitate again subside and repeat the washings with hot distilled water until the washings give no precipitate with barium chloride, then drain and dry the precipitate.

Uses. This is considerably used externally in the form of ointment and washes, and is the working basis of many other of the zinc salts. Calamine is used for making ointments, and in injections etc.

ZINCI CHLORIDUM. U. S. Zinc Chloride.

"It should contain, when anhydrous, not less than 99.5 percent. of pure Zinc Chloride, and should be kept in small, glass-stoppered bottles." < U. S.

"Zinc Chloride is produced by the interaction of hydrochloric acid and zinc." < Br.

Preparation. Commercial zinc chloride is prepared by adding zinc to hydrochloric acid and water as long as it will dissolve, then evaporating until it will solidify. The pure salt was made by the 1885 Br. P. formula as follows:

Granulated Zinc,	16 ounces av.
Hydrochloric Acid,	44 fl.ounces
Solution of Chlorine,	a sufficiency
Distilled Water,	20 fl.ounces

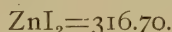
Put the zinc into a porcelain basin, add by degrees the hydrochloric acid, previously mixed with the water, and aid the action by gently warming on a sand-bath until the gas no longer is evolved, boil for half an hour, supplying the water lost by evaporation, and allow to stand in a cool part of the sand-bath for 24 hours, stirring frequently.

The liquid is then tested for iron or lead, which are removed, if present, by the solution of chlorine and carbonate of zinc. It is then filtered and evaporated to a liquid which solidifies when cold, and moulded, granulated or otherwise put up for convenient use.

For many purposes it is unnecessary to make a chemically pure salt, as above directed. Ordinary zinc chloride may be made by dissolving zinc to saturation in hydrochloric acid and evaporating the solution to dryness.

Uses. Zinc chloride is considerably used as an antiseptic and disinfectant. It is also employed as an escharotic, and is a favorite application for warts, excrescences etc.

ZINCI IODIDUM. U. S. Zinc Iodide.



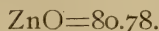
"It should contain, when anhydrous, not less than 98 percent. of pure Zinc Chloride, and should be kept in small, glass-stoppered bottles, protected from light." <U. S.

Preparation. This may be prepared by digesting granulated zinc in excess with iodine diffused in water in a manner similar as directed for making iron iodide, which see.

Uses. This is given as an alterative in doses of $\frac{1}{2}$ to 2 grains.

Average dose.—0.065 Gm.=65 milligrammes (1 grain).

ZINCI OXIDUM. U. S. Zinc Oxide.



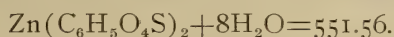
"It should contain not less than 99.5 percent. of pure Zinc Oxide." <U. S.

"Zinc Oxide may be prepared by exposing zinc carbonate to a dull red heat, or from metallic zinc, by combustion." <Br.

Preparation. The 1885 Br. P. directs red carbonate of zinc, 6 ounces, to be placed in a loosely-covered Hessian crucible and exposed to a dull red heat until a portion, taken from the center of the contents of the crucible and cooled, no longer effervesces when moistened with water and dropped into diluted sulphuric acid. The carbonic acid and water are expelled by heat.

Uses. Commercial zinc oxide is extensively used for a paint base and for many industrial purposes. Pure zinc oxide is used extensively in powder and in the form of ointment. It is also used as an ingredient in face powders, liquid cosmetics etc.

Average dose.—0.250 Gm.=250 milligrammes. (4 grains).

ZINCI PHENOLSULPHONAS. U. S. Zinc Phenolsulphonate.

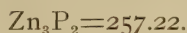
"It should contain, in uneffloresced crystals, not less than 99.5 per cent. of pure Zinc Paraphenolsulphonate $[(\text{C}_6\text{H}_4(\text{OH})\text{SO}_3)_2\text{Zn}] : 4 + 8\text{H}_2\text{O}$], and should be kept in small, well-stoppered vials." <U. S.

Average dose.—0.125 Gm.=125 milligrammes (2 grains).

Zinci Sulphocarbolas. Br. Zinc Sulphocarbonate.

"Zinc Sulphocarbonate, or zinc phenol-para-sulphonate, $\text{Zn}(\text{OH} \cdot \text{C}_6\text{H}_4 \cdot \text{SO}_3)_2 \cdot \text{H}_2\text{O}$, may be obtained by heating a mixture of phenol and sulphuric acid, and saturating the product with zinc oxide." <Br.

Uses. This is used as an antiseptic and astringent, chiefly for spray lotions, injection and washes in solution 2 to 5 grains to the ounce.

ZINCI PHOSPHIDUM. Zinc Phosphide.

This may be made by fusing zinc in a properly constructed apparatus and passing over the melted mass vapors of phosphorus in a current of dry hydrogen until the zinc is converted into a phosphide. It is only made by manufacturing chemists.

Uses. Zinc phosphide is a nerve stimulant and aphrodisiac, largely given for nervous debility and loss of vital power. It is safer and less irritating than phosphorus. The dose is from $\frac{1}{20}$ to $\frac{1}{8}$ grain in powder or pills.

ZINCI STEARAS. U. S. Zinc Stearate.

A very fine, bulky, white powder, tasteless and having a very faint odor, resembling that of fat. It is insoluble in water, alcohol or ether.

Preparation Zinc stearate may be prepared by precipitating a solution of stearic acid with a salt of zinc, or by the decomposition of sodium stearate with a soluble zinc salt. It is insoluble in water, alcohol or ether. It is applied as a dusting powder and may be used as a snuff, or in the form of ointment with starch plasma, either alone or in combination with other antiseptics and emollients.

ZINCI SULPHAS. U. S., Br. Zinc Sulphate.

"It should contain, in uneffloresced crystals, not less than 99.5 per cent. of pure Zinc Sulphate $[\text{SO}_2 \cdot \text{O}_2\text{Zn} + 7\text{H}_2\text{O}]$, and should be kept in well-stoppered bottles." <U. S.

"Zinc Sulphate is formed by the interaction of diluted sulphuric acid and zinc." <Br.

Preparation. The 1885 Br. P. directed this salt to be made as follows:

Sulphuric Acid,	12 fl.ounces
Granulated Zinc,	16 ounces av.
Distilled Water,	80 fl.ounces
Solution of Chlorine, a sufficiency.	

Carbonate of Zinc, $\frac{1}{2}$ ounce av., or a sufficiency.

Pour the sulphuric acid, previously mixed with the water, on the zinc contained in a porcelain vessel, and when effervescence has nearly ceased, aid the action by heat.

A few drops of the liquid may then be tested for iron by adding excess of ammonia and then sulphhydrate of ammonium, when a black precipitate will be produced if iron is present. For commercial zinc sulphate it is unnecessary to remove it, but if a pure salt is desired the solution may be freed from it by adding the solution of chlorine until the liquid acquires a permanent odor of chlorine, then add, with continued agitation, the carbonate of zinc until a brown precipitate appears and all the iron is precipitated, then filter, and evaporate until a pellicle forms on the surface and crystallizes.

Uses. Zinc sulphate is an astringent and tonic much used for injections, eye-water, washes etc., and internally as an astringent in doses of 1 to 2 grains, and as an emetic in doses of 10 to 30 grains.

Its solution in water is a disinfectant and antiseptic, and may be used, much diluted, as a wash for ulcers, sores etc.

ZINCI VALERAS. U. S. Zinc Valerate.

Zinci Valerianas. Br. Zinc Valerianate.



"It should contain not less than 99 percent. of pure Zinc Valerate $[(\text{C}_4\text{H}_9\text{COO})_2\text{Zn} + 2\text{H}_2\text{O}]$, and should be kept in small, well-stoppered bottles." < U. S.

"Zinc Valerianate, or zinc iso-valerianate, may be prepared by saturating iso-valerianic acid with zinc carbonate, or by the interaction of zinc sulphate and sodium iso-valerianate." < Br.

Preparation. The formula of the Br. P. was as follows:

Zinc Sulphate,	5½ ounces av.
Sodium Valerianate,	5 ounces av.
Distilled Water, a sufficiency.	

Dissolve the zinc sulphate and sodium valerianate, each separately, in 40 fl.ounces of water, heat both the solutions to near the boiling point, mix them, cool and skim off the crystals which are produced, evaporate the mother liquor at a temperature not exceeding 200° F., until it is reduced to 4 fl.ounces; cool again, remove the crystals which form and add to those before obtained, drain on filter paper, wash with a little cold distilled water, drain and dry.

Uses. This salt is used as a nervine and antispasmodic in doses of 1 to 3 grains.

HOMŒOPATHIC MEDICINES.

The medicinal substances used in homœopathic practice are, practically, the same as are used by other practitioners of medicine—vegetable drugs, animal drugs, minerals and chemicals, and the usual solvents and vehicles employed in preparing medicines. The manner of preparation and the theory of medication constitutes the difference in homœopathy from other forms of practice, both in the manner of preparation of the remedies, and their application and dosage. In the following pages the principles of Homœopathic pharmacy and the manner of preparation of Homœopathic medicines is briefly explained.

Homœopathic Tinctures.

The tinctures of Homœopathic pharmacy are mostly supplied by Homœopathic manufacturing pharmacists, but there is no reason why they should not be made by pharmacists, the same as other tinctures. As a great number are prepared from a great variety of substances, it will be impracticable to give detailed formulas for each, but the general method and formulas for making the different classes and potencies are given. The original tinctures are called "Mother Tinctures;" their dilutions or attenuations are called "Potencies," and are known as first, second, third etc. in the centesimal scale, or 1x, 2x, 3x etc. in the decimal scale, as explained below.

Class I. Tinctures.

Tinctures are prepared with equal parts, by weight, of the juice of the plant and alcohol. The freshly-gathered plant or part which is used is chopped and pounded to a pulp, which is enclosed in a piece of new linen and subjected to pressure. The expressed juice is then mixed, with brisk agitation, with an equal weight of alcohol, the mixture allowed to stand eight days in a well-stoppered bottle in a dark, cool place, and then filtered.

The drug power of tinctures thus prepared is $\frac{1}{2}$.

Potentiation—Centesimal Scale. The first potency is prepared by mixing 2 minims of the tincture with 98 minims of diluted alcohol. The second potency is prepared by adding 1 minim of the 1st potency to 99 minims of alcohol. Each succeeding higher potency is prepared in the same manner as the second by adding 1 minim of the next lower to 99 minims of alcohol.

Decimal Scale. The first or 1x potency is prepared by adding 2 minims of the tincture to 8 minims of diluted alcohol. The second or 2x potency is prepared by mixing 1 minim of the 1x potency with 9 minims of diluted alcohol.

The 3d or 3x potency is prepared by adding 1 minim of the 2x potency to 9 minims of diluted alcohol. The higher potencies are prepared in a like manner from the next lower.

Class II. Tinctures.

Tinctures expressed by the aid of 2 parts of alcohol added to 3 parts of plant or the part of plant used.

The finely-chopped fresh plant or part which is used is weighed, and to every 3 parts, 2 parts, by weight, of alcohol are taken. The chopped plant is moistened with sufficient alcohol to make it into a thick mass or pulp when well stirred together. The remainder of the alcohol is then added and the whole mixed together and strained through a piece of new linen. The tincture thus obtained is allowed to stand eight days in a well-stoppered bottle, then filtered.

The drug power of tinctures thus prepared is $\frac{1}{2}$.

Potentialion. As the drug power of the tinctures thus prepared is the same as Class I., their potencies are prepared in exactly the same manner as is directed for preparing them.

Class III. Tinctures.

Tinctures prepared with 2 parts, by weight, of alcohol, to 1 part of plant or part of plant used.

The fresh plant or part of plant taken is pounded to a fine pulp and weighed, then 2 parts, by weight, of alcohol are taken; one-sixth of it being first mixed with the pulp and then the remainder added, well stirred together and set aside in a cool, dark place for eight days. The tincture is then decanted, strained and filtered.

The drug power of tinctures thus prepared is $\frac{1}{6}$.

Potentialion—Centesimal Scale. The first potency is prepared by mixing 6 minims of the tincture with 94 minims of diluted alcohol. The 2nd potency is prepared by adding 1 minim of the first potency to 99 minims of the alcohol. Each successive higher potency is prepared in the same manner as the 2nd, by adding 1 minim of the next lower to 99 minims of alcohol.

Decimal Scale. The first or 1x potency is prepared by adding 6 minims of the tincture to 4 minims of diluted alcohol. The second or 2x potency is prepared by adding 1 minim of the 1x potency to 9 minims of diluted alcohol. The 3d or 3x potency is prepared by adding 1 minim of the 2x potency to 9 minims of diluted alcohol. The higher potencies are prepared from the next lower in a like manner.

Class IV. Tinctures.

Tinctures prepared with 5 parts, by weight, of alcohol to 1 part of the dried and finely powdered substance, or fresh animal substances.

Weigh the substance and pour over it 5 parts, by weight, of alcohol and let the mixture remain eight days or longer, at ordinary temperature, in a dark place, shaking it twice a day, then pour off, strain and filter. (Fresh animal substances are pounded).

The drug power of tinctures thus prepared is $\frac{1}{10}$.

Potentialion—Centesimal Scale. The first potency is prepared by adding 10 minims of the tincture to 90 minims of alcohol. The 2nd potency is prepared by adding 1 minim of the 1st potency to 99 minims of alcohol. Each successive higher potency is prepared in the same manner as the second, by adding 1 minim of the next lower to 99 minims of alcohol.

Decimal Scale. As the tincture contains $\frac{1}{10}$ drug power, it corresponds to the first or 1x potency. The 2nd or 2x potency is prepared by adding 1 minim of the tincture to 9 minims of alcohol. The higher potencies are prepared in the same manner from the next lower.

Homœopathic Solutions.

Although these are not properly classified under tinctures, they most conveniently come in this connection, and are therefore given here.

Class V.—a. Aqueous Solutions.

One part, by weight, of the medicinal substance, dissolved in 9 parts, by weight, of distilled water.

Amount of drug power of solution $\frac{1}{10}$.

Potentialion—Centesimal Scale. The first potency is made by adding 10 minims of the solution to 90 minims of distilled water. The second potency is made by adding 1 minim of the 1st potency to 99 minims of alcohol. The higher potencies are prepared in the same manner from the next lower.

Decimal Scale. The original solution contains $\frac{1}{10}$ drug power and is, therefore, the first or 1x potency. The second or 2x potency is prepared by adding 1 minim of the solution to 9 minims of distilled water. The third or 3x potency is prepared by adding 1 minim of the 2x potency to 9 minims of diluted alcohol. Higher potencies are prepared from the next lower in the same manner, by adding 1 minim to 9 minims of alcohol.

Class V.— β . Aqueous Solutions.

One part, by weight, of the medicinal substance is dissolved in 99 parts, by weight, of distilled water.

The amount of drug power of the solution is $\frac{1}{100}$.

Potentialion—Centesimal Scale. As the drug power of the solution is $\frac{1}{100}$, it corresponds to the first potency. The second potency is prepared by adding 1 minim of the original solution to 99 minims diluted alcohol. The higher potencies are prepared from the next lower by adding 1 minim to 99 minims of alcohol.

Decimal Scale. As the solution contains $\frac{1}{100}$ drug power, it corresponds to the second or 2x potency. The third or 3x potency is prepared by adding 1 minim of the solution to 9 minims of alcohol. Higher potencies are prepared in a like manner from the next lower.

Class VI.— α . Alcoholic Solutions.

One part, by weight, of the medicinal substance is dissolved in 9 parts, by weight, of alcohol.

The amount of drug power of the solution is $\frac{1}{10}$.

Potentialion. The potencies are prepared in the same manner as those of the aqueous solutions, α , using alcohol as the diluent instead of distilled water.

Class VI.— β . Alcoholic Solutions.

One part, by weight, of the medicinal substance is dissolved in 99 parts, by weight, of alcohol.

Amount of drug power of the solution $\frac{1}{100}$.

Potentialion. The potencies are prepared in the same manner as those of the aqueous solutions, β , using alcohol as the diluent instead of distilled water.

Homœopathic Triturations.

In Homœopathic pharmacy triturations are considerably used, but their strength does not correspond at all with those of regular pharmacy. Aside from the particular directions for manipulating, which amount only to insure that the substances shall be thoroughly triturated together, the directions for making them are as follows:

Triturations on the Centesimal Scale.

This scale was introduced by Hahnemann, and is still employed for making the higher potencies, the lower being generally made by the Decimal Scale.

Class VII.—Trituration of Dry Medicinal Substances.

First Trituration. Take 1 grain or part of the medicinal substance, and 99 grains or parts of sugar of milk; add the medicinal substance to about one-third of the sugar of milk in an unglazed porcelain mortar and triturate them thoroughly for 6 minutes, then scrape the trituration from the sides to the center of the mortar with a porcelain spatula and stir it thoroughly with the same for 4 minutes, and again triturate for 6 minutes as before. To this powder again scraped up for 4 minutes, now add the second third of the quantity of sugar of milk, triturate and scrape up as before twice successively, then add the remainder of the sugar of milk and combine it with the powder in the mortar by trituration and scraping up as previously directed.

This is the first or standard trituration, containing 1 percent. of the medicinal substance. It is known as the First Centesimal Trituration.

Second Trituration. Take 1 grain or part of the first trituration and 99 grains or parts of sugar of milk and prepare by triturating portions of the sugar of milk successively added with the first trituration in the same manner as directed for making the first trituration. This contains 1 part of the medicinal substance in 10000, and is called the Second Centesimal Trituration.

Third Trituration. Take 1 grain or part of the second trituration and 99 grains or parts of milk sugar and prepare a trituration in the same manner as previously directed. This contains 1 part of the medicinal substance in 1000000 parts of the trituration, and is called the Third Centesimal Trituration.

Liquid Potencies. The third trituration may be converted into liquid potencies by dissolving in alcohol and water, in the following manner: One grain or part of the third centesimal trituration is added to 50 minims or parts of distilled water and agitated, then when dissolved, 50 minims or parts of alcohol are added, and the stoppered vial, only $\frac{2}{3}$ full, is shaken 10 times. This is the Fourth Potency.

One minim of this liquid (the fourth potency) is added to 99 minims of alcohol and the vial shaken 10 times to make the Fifth Potency, and so on; the theory being that the higher the potency used the more effective the medicine. Attenuations above the thirteenth are termed High Potencies.

Triturations on the Decimal Scale.

This scale was introduced by Dr. Hering, and is used for the lower potencies.

First Decimal Trituration. Take 10 parts or grains of the medicinal substance and 90 parts or grains of sugar of milk, and prepare a trituration in the same manner as is directed for making the centesimal triturations.

The Second Decimal Trituration is prepared by taking 10 parts of the first with 90 parts sugar of milk.

The Third is made by taking 10 parts of the second with 90 parts of the sugar of milk etc., each higher trituration representing 10 parts of the next below.

Liquid Potencies. The sixth decimal, 6x trituration, is converted into liquid potencies by adding 1 grain or 1 part to 50 minims or parts of distilled water, then, when dissolved, adding 50 minims or parts of alcohol. This is called the Eighth Potency (8x). One minim of this with 9 minims of diluted alcohol gives the Ninth Potency (9x). Higher potencies in this scale are made in the same manner by adding one minim of the next lower to 9 minims of diluted alcohol. The mixture must be shaken ten times by ten powerful downward strokes of the arm.

Class VIII.—Trituration of Liquid Substances.

These are prepared according to the Centesimal Scale by triturating 1 minim or part, by weight, of the liquid with 99 grains or parts of sugar of milk for the first; 1 part of the first with 99 parts of sugar of milk for the second, and so on, as has been previously described.

By the Decimal Scale 1 part of the liquid is triturated with 9 parts of sugar of milk for the second and so on.

These have been converted into liquid potencies in the same manner as has already been described.

Class IX.—Trituration of Fresh Vegetable and Animal Substances.

Fresh vegetable or animal substances are first pounded or grated to a fine pulp, then triturated and potentized as directed in the foregoing classes.

To make the first trituration of the Centesimal Scale, 2 parts, by weight, of the substance are triturated with 99 parts, by weight, of sugar of milk. (Two parts are taken because of loss of weight of the fresh substance due to exposure during the trituration).

The second trituration is made with 1 part of the first and 99 parts of sugar of milk as heretofore described.

To make these triturations of the Decimal Scale, 2 parts, by weight, of the fresh substance are triturated with 9 parts, by weight, of sugar of milk for the 1x trituration.

One part, by weight, of the 1x, to 9 parts, by weight, of the sugar of milk, gives the 2x trituration, etc.

These are converted into Liquid Potencies, either of the Centesimal or Decimal Scale, as described in Class VII.

Medicated Globules, Pellets or Discs.

These are prepared by saturating the pellets, globules or discs with alcoholic solution of whatever potency may be desired, then draining off the superfluous fluid and allowing to dry. These globules or pellets are of different sizes, and are known as No. 8, 10, 15, 20, 25, 30, 40, 50, 60, 70 and 80, according to their size—No. 8 being the smallest and No. 80 the largest; the most commonly used being from No. 20 to No. 40.

PART III.

STANDARD REMEDIES AND PROPRIETARY MEDICINES

The foregoing articles and formulas, comprising Part II. of this work, include most of the drugs and preparations both official and unofficial, known or required in the regular practice of pharmacy in this country. There are, however, many other preparations for which there is a demand in the drug business as it is conducted, and the pages which follow will be devoted to the consideration of special lines of preparations, which though not essential to the practice of pharmacy, are closely connected with its interests.

The following formulas are designed for making a complete line of Standard Proprietary Remedies, which may be prepared and put up by druggists, or others, for local trade or for the market.

It is well known to all who are conversant with the business that the making of Proprietary or "Patent" Medicines requires no expert knowledge or facilities that are not ready at hand or readily obtainable by the average druggist.

With reliable formulas and outfits of wrappers, cartons and labels, which may now be had specially designed for that purpose, druggists may prepare and put up a line of proprietary medicines or articles in the most attractive style, with but a slight outlay, and may reap an abundant reward in the way of profits.

It is needless to urge the advantages of putting up and furnishing, as far as possible, their own "Patent" Medicines in place of manufacturers. The profit of several hundred percent., the reputation which naturally comes of putting before the people their own preparations; the constantly increasing trade in this line; and the satisfaction of

furnishing reliable articles *worth* the money, should be inducement enough for any enterprising druggist to make the attempt to sell a line of his own preparations.

The formulas which follow in this department are mainly original, and are intended to make preparations similar to those which have been best received or which possess the greatest merit. They are not, however, given as the exact formulas of particular proprietary preparations now in the market or made by any particular manufacturer. Some formulas also, not original, for old and well-known preparations, are given as selected from the best authorities. Besides the formulas given in this section, many others that may be put up as proprietary remedies are given in various departments of this work, and may be found by referring to the index.

The requirements of the Food and Drugs Act, June 30, 1906, applies to all put-up medicines intended for inter-state commerce. See this act.

ACID PHOSPHATE.

A proprietary remedy, known as Horsford's Acid Phosphate, put up by the Rumford Chemical Works, Providence, R. I., has had a large sale in this country. The title "Acid Phosphate" is claimed by them as a trade mark, but the courts have decided that the title "Acid Phosphate," being descriptive words, cannot be held as a trade mark, therefore anyone who chooses is at liberty to put up an Acid Phosphate, provided it is not a colorable imitation of Horsford's. Several formulas for acid phosphate have been given in the preceding pages, but for convenient reference, formulas are also given in this department.

Solution Phosphates Compound,	1 pint
Water,	4 pints

Mix them, and after standing, filter. This corresponds very nearly with the supposed composition of the preparation above named, which is said to contain in each fl. drachm 3 grains calcium phosphate, $\frac{1}{2}$ grain iron phosphate, $\frac{1}{2}$ grain magnesium phosphate, $\frac{1}{3}$ grain potassium phosphate, with excess of phosphoric acid.

Liquor Acidi Phosphorici. In 1880 James T. Shinn published the following formula in the A. J. P. as similar to Horsford's:

Calcium Phosphate, precipitated,	384 grains
Magnesium Phosphate,	256 grains
Potassium Phosphate,	192 grains
Phosphoric Acid, (60%),	640 minims
Water, a sufficient quantity to make	16 fl. ounces

Mix, dissolve and filter.

Liquor Acidi Phosphorici Compositum.

Calcium Phosphate, precipitated,	384 grains
Magnesium Phosphate,	64 grains
Potassium Phosphate,	32 grains

Iron Phosphate,	64 grains
Phosphoric Acid, (60%),	816 minims
Water, a sufficient quantity to make	1 pint
Mix, dissolve and filter.	

The dose of this preparation is from $\frac{1}{2}$ to 1 teaspoonful in sweetened water after each meal and before retiring.

This may be used at the soda fountain, making an agreeable acid addition to fruit syrups etc., but solutions of tartaric or citric acids are now generally used to prepare "phosphate" drinks.

AGUE CURES.

The proprietary remedies for ague which are found on the market consists of syrups, solutions or tinctures, mixtures, powders and pills. They are given for chills and fever, ague, neuralgia, malaria etc. The syrups are the most palatable of the ague cures, but are less effective than the stronger remedies prepared in the form of tinctures, mixtures and pills. All ague cures depend for their value upon the proper combination of antiperiodics and alteratives, both being essential, the former to "break" the chills, and the latter to stimulate the organs to throw off the diseased matter with which they have become loaded. The following are representatives of the different varieties of ague preparations which are found in the market. Ague preparations are now much less used than formerly.

Ague Cure or Syrup.

For Chills, Fever and Malaria.

Quinine Sulphate,	128 grains
Cinchonidine Sulphate,	128 grains
Diluted Sulphuric Acid,	3 fl.drachms
Alcohol,	2 fl.ounces
Oil of Wintergreen,	10 minims
Fluidextract of Sarsaparilla Compound,	2 fl.ounces
Water,	5 fl.ounces
Sugar,	14 ounces av.

Mix the sulphates with the water, add sufficient of the acid to dissolve them. Add the oil of wintergreen to the alcohol and add the solution to the solution of the cinchona salts. Then add the fluidextract of sarsaparilla, mix them thoroughly and, after standing a few days, filter and dissolve the sugar in the filtrate by agitation.

A fl.drachm contains 2 grains of cinchona salts. The dose is a teaspoonful to a tablespoonful for ague and chills.

Ague Mixture or Cholagogue.

This mixture is similar to several preparations on the market known as cholagogues. It is an unsightly compound, as it contains quite a precipitate, but is very effective.

Quinine Sulphate,	$\frac{1}{2}$ ounce av.
Cinchonidine Sulphate,	$\frac{1}{2}$ ounce av.
Fluidextract of Stillingia,	3 fl.ounces
Fluidextract of Leptandra,	1 fl.ounce
Fluidextract of Podophyllum,	$\frac{1}{2}$ fl.ounce
Fowler's Solution of Arsenic,	$\frac{1}{4}$ fl.ounce
Oil of Wintergreen,	1 fl.drachm
Solution of Saccharin,	2 fl.drachms
Syrup, sufficient to make	1 pint

Rub the sulphates with the fluidextracts, add the oil and then mix thoroughly with the syrup and solution of arsenic.

A fl.drachm contains about $3\frac{1}{2}$ grains of the cinchona salt.

The dose is $\frac{1}{2}$ teaspoonful to a dessertspoonful, for chills.

This is similar to the proprietary Osgood's Indian Cholagogue, which has been a popular ague cure for nearly half a century.

In the older preparations for ague no attempt was made to mask the unpleasant taste and appearance of the remedy. The demands of modern pharmacy require ague preparations of the present day to be pleasant to the taste and sightly, therefore "Tasteless Chill Cures" (although they do not entirely correspond to their name) are in demand and the older compounds, except in the form of pills, have nearly taken a back seat.

Tasteless Ague Cure or Tasteless Chill Cure.

Quinine Sulphate,	128 grains
Potassium Carbonate,	$\frac{1}{4}$ ounce av.
Solution of Saccharin,	2 fl.drachms
Fowler's Solution of Arsenic,	2 fl.drachms
Water,	1 fl.ounce
Syrup Yerba Santa Compound,	15 fl.ounces

Rub the salts together with the water, add the Fowler's solution and the syrup and mix them well together. In this preparation the quinine is held in suspension and the mixture must be shaken before taking.

Ague and Neuralgia Pills.

Quinine Sulphate,	50 grains
Cinchonidine Sulphate,	50 grains
Arsenous Acid,	2 grains
Strychnine Sulphate,	$\frac{1}{2}$ grain
Podophyllum Resin,	20 grains
Leptandrin,	60 grains

Extract of Dandelion, q. s. to make a mass.

Mix thoroughly and make into 100 pills. The dose for children is 1 to 2 pills, for adults 2 to 4 pills.

ALTERATIVES.

Although most of the blood purifiers and sarsaparillas on the market are known as alteratives, a few preparations which are supposed to have an especially alterative action on the various organs of secretion are known as Alteratives. The following are representatives of this class of preparations:

Alterative Compound. Blood and Liver Syrup.

Stillingia, in No. 40 powder,	8	ounces av.
Sarsaparilla, in No. 30 powder,	8	ounces av.
Burdock Root, in No. 30 powder,	3	ounces av.
Blue Flag Root, in No. 20 powder,	1½	ounces av.
Mandrake, in No. 50 powder,	1½	ounces av.
Senna, in No. 20 powder,	11½	ounces av.
Prickly-Ash Bark, in No. 50 powder,	¾	ounce av.
Sarsaparilla Flavoring,	½	ounce av.
Diluted Alcohol,	4	pints
Sugar,	5	pounds
Water, a sufficient quantity.		

Mix the drugs, moisten them with 2 pints of diluted alcohol and macerate in a covered vessel in a warm place for 24 hours, transfer to the water-bath percolator, pack moderately, pour upon them 2 pints of diluted alcohol and set in a warm place for 1 day; then heat moderately and after 1 hour begin to percolate slowly, adding water to the drugs after the liquid has ceased to drop, and continuing the heat and percolation until 5½ pints have passed. To this add the sarsaparilla flavoring and, after standing a few days, filter, adding through the filter enough water to make 5½ pints, then dissolve the sugar in the filtrate by agitation and add, if necessary, water sufficient to make 1 gallon of the preparation. One ounce iodide of potassium may be added if desired.

Fluidextract of the vegetable drugs may be used in the same quantities as is directed of the drugs, if desired. After mixing add diluted alcohol and water and filter, then dissolve the sugar in the filtrate.

This is an excellent alterative compound, which may be put up under many names as—Blood Purifier, Sarsaparilla, Alterative, etc.

The dose is from 1 to 2 teaspoonfuls, three times a day.

Many other formulas of similar composition will be found under other headings in this work.

Alterative Extract or Juice.

("Succus Alterans.")

The original formula for this preparation was introduced by Geo. W. McDade, M. D., of Montgomery, Ala., who obtained it from the Creek

Indians (?). It is claimed to be prepared from the fresh green medicinal plants, each pint bottle containing the "unimpaired" virtues of 16 tr.ounces of the true medicinal plants—*Stillingia Sylvatica*, *Smilax Sarsaparilla*, *Phytolacca Decandra*, *Lappa Minor* and *Xanthoxylum Carolinianum*. It is furnished to the trade by several manufacturers under the name McDade's Prescription or "Succus Alterans."

It is, of course, impractical for druggists to obtain the fresh plants, which are claimed to compose the original article, but a good Alterative Extract of similar composition may be made from the following formula, the ingredients of which are mentioned in the McDade prescription:

Stillingia Root,	24 ounces av.
Sarsaparilla Root,	24 ounces av.
Poke Root,	8 ounces av.
Burdock Root,	16 ounces av.
Southern Prickly-Ash Bark,	4 ounces av.
Alcohol,	6 pints
Glycerin,	1 pint
Water, sufficient to make	1 gallon

Grind the drugs to a coarse powder, moisten them with 3 pints of alcohol mixed with 2 pints of water and macerate for 24 hours in a covered vessel, then transfer to a water-bath percolator, pack firmly, pour on the remainder of the alcohol (3 pints) mixed with 3 pints of water, and set in a warm place for 1 day, then heat moderately and, after 1 hour begin to percolate, adding water to the drugs and continuing the heat and percolation until 7 pints of percolate are obtained. Continue the percolation with water until 4 pints more have passed, evaporate this to a soft extract; add to it the glycerin and the 7 pints of percolate previously obtained and, after standing a few days, filter.

Fluidextracts of the drugs named may be used in the same quantities as is directed of the drugs, with the glycerin, alcohol 1 pint, sugar and water as directed. The alcohol and water should be added to the fluid-extracts and the mixture filtered before dissolving the sugar and adding the glycerin.

The dose is a teaspoonful to a dessertspoonful three times a day.

ANALGESICS AND ANTIPYRETICS.

Among remedies of recent origin several proprietary analgesics and antipyretics have become quite prominent. They are chiefly used by physicians and are not put up like "patent medicines" for the general trade, but are, nevertheless, proprietary. Most of them are noticed in Part II. under various headings. Several, like *Antikamnia* etc., are noticed elsewhere, and others, like *Antifebrin*, *Antipyrin* and *Phenacetin* have been made official under other titles. A few which are not included under other headings are given here.

Ammonol. Ammoniated Phenylacetamid.

A preparation by this name is prepared by the Ammonol Chemical Co., and is advertised as an analgesic and antipyretic. Several formulas for it have been published, from which the following may be selected:

Acetanilide,	2 ounces
Sodium Bicarbonate,	1 ounce
Ammonium Carbonate,	1 ounce
Yellow Coloring, in powder, a sufficient quantity.	

Rub the ingredients together and color slightly yellow with aniline yellow or powdered turmeric. Dose 5 to 10 grains.

Analgesic Powder.

Powders by this and similar other names are put up by most of the manufacturing pharmacists. They are similar to Pulvis Acetanilidi Comp. now official, the composition and properties varying somewhat, but being chiefly acetanilide 6 to 7 parts, sodium bicarbonate 2 to 4 parts and caffeine 1 part. See page 904, Part II.

Analgine.

A compound powder stated by the manufacturers to contain in each troy ounces acetanilide 219 grains, extract cannabis indica 11 grains, extract hyoscyamus, sodium bicarbonate, sodium salicylate, monobromated camphor, each, 22 grains; caffeine 27½ grains and enough aromatic powder (135 grains) to make 1 tr.ounce.

Antikol or Anti-Calor.

This is claimed by the manufacturers to contain in each 10 grains, $\frac{1}{10}$ grain quinine bisulphate, 1 grain caffeine citrate, with acetanilide and sodium bicarbonate.

Caffeotanolid.

This is composed of acetanilide, sodium bicarbonate and caffeine, probably in about the proportions of 7, 2 and 1.

Zomakyne is a similar preparation.

ANODYNES AND HYPNOTICS.

Two kinds of anodyne preparations may be made and put up as proprietary medicines. Those containing ether, like Hoffmann's Anodyne, not having a bad after effect, and those containing opium, morphine or chloral, which, though effective, are unsafe preparations to introduce to the general public. The term Anodyne is also used in connection with many other preparations, as "Tolu Anodyne," for coughs, "Clove Anodyne," for toothache etc., but these will be found under other headings.

Formulas are only given for the etherial and harmless anodynes. If desired, formulas for others will be found under other departments. See preparations of opium, chloral, cocaine etc.

Anodyne Elixir.

Pain-Soothing Cordial without Opium or Chloral.

An anodyne without opium or chloral is desirable and valuable, yet no such preparation is found in the market. The following is recommended to those who desire to put up such a preparation. It is effective and at the same time harmless:

Potassium Bromide,	2 ounces av.
Sugar,	5 ounces av.
Ether,	1 fl.ounce
Alcohol,	2 fl.ounces
Tincture of Hyoscyamus,	3 fl.ounces
Elixir,	3 fl.ounces
Water,	4 fl.ounces

Dissolve the potassium bromide and the sugar in the water, mix the ether with the alcohol, add the tincture of hyoscyamus, then the elixir, and, having mixed them, add the solution of potassium bromide and sugar to the mixture and mix them thoroughly.

A fl.drachm contains about 7 grains potassium bromide, 4 minims of ether and 12 minims of tincture of hyoscyamus. It may be given in doses of a teaspoonful to a dessertspoonful every hour, or in severe cases of colic, cholera morbus etc., a teaspoonful every 15 minutes until relieved.

As the ether in this preparation, although adding much to its effectiveness, is rather disagreeable to the taste. Its place may be supplied with $1\frac{1}{2}$ fl.drachms of chloroform, or it may be omitted altogether.

Chlor-Anodyne.

Morphine Hydrochloride,	46 grains
Tincture Cannabis Indica,	$1\frac{3}{4}$ fl.ounces
Chloroform,	$1\frac{3}{4}$ fl.ounces
Oil of Peppermint,	24 minims
Tincture Capsicum,	24 minims
Hydrochloric Acid, dilute,	144 minims
Glycerin,	$2\frac{1}{2}$ fl.ounces
Alcohol, sufficient to make	16 fl.ounces

Mix. Dose 5 to 10 drops.

Golden Anodyne Tincture.

A preparation similar to Hoffmann's Anodyne, of a yellow or golden color, is considerably in demand among the Germans, under the name "Golden Tincture." Various formulas have been given for preparing it, the following being as satisfactory as any:

Ether, Sulphuric,	1 ounce
Alcohol,	2 ounces
Tincture Turmeric, sufficient to color.	

Or it may be colored with fustic wood, by maceration.

This is, in effect, the same as Hoffmann's Anodyne, but is more attractive. The dose is 10 to 60 minims, for pain, cramp etc.

Another formula is: Ether 1 ounce, laudanum 1 ounce, chloroform $\frac{1}{4}$ ounce, colored with tincture turmeric.

Papine.

A proprietary anodyne prepared from opium by Battle & Co., St. Louis, claims to represent the anodyne power of $\frac{1}{8}$ grain of morphine in a fl.drachm. A preparation may be made with

Deodorized Tincture of Opium,	2½ fl.ounces
Elixir,	13½ fl.ounces

Mix them, the dose is a teaspoonful.

Hypnotics.

Many medicinal compounds for which formulas are given in Part II. are hypnotics, but that title is seldom applied to them. Bromide-Chloral Compound, Bromidia, Chloralamid, Sulphonal, Elixir of Six Bromides etc. will be found by reference to the index. The following which are more particularly designated as hypnotics are given:

Silvia's Hypnotic.

A formula prepared from the published statement of the constituents is: Potassium bromide 4 ounces av.+170 grains, morphine sulphate 8 grains, hydrated chloral 2 ounces av.+85 grains, fluidextract hyoscyamus 6½ fl.drachms, tincture of vanilla 2 fl.drachms, spirit of orange 1 fl.drachm, spirit of anise 1 fl.drachm, water sufficient to make 16 fl.ounces. Mix, dissolve and filter.

Walpole's Hypo-Bromic Compound.

Chloral,	1920 grains
Extract of Hyoscyamus,	16 grains
Potassium Bromide,	960 grains
Extract of Cannabis Indica,	16 grains
Morphine Sulphate,	8 grains
Elixir, sufficient to make	16 fl.ounces

Mix, dissolve and filter.

Other liquid anodyne preparations will be found under other headings, as antipyretics, chlorodyne, sedatives, nervines etc.

ANTISEPTICS.

A great many antiseptic compounds are found upon the market, but most of them bear other titles than "Antiseptic," the term being generally used as an adjective in connection with some other title. Some formulas will be found under other titles throughout Part II. and among Toilet and Miscellaneous Preparations. The following formulas are given here:

Antiseptic Solution.

Boroglycerin Glycerite,	3 fl.ounces
Thymol,	20 grains
Resorcinol,	60 grains
Benzoic Acid,	60 grains
Eucalyptol,	30 minims
Alcohol,	8 fl.ounces
Water, sufficient to make	32 fl.ounces
Mix and dissolve.	

Antiseptic Powder.

For External Use, Wounds, Etc.

A great many antiseptic powders are put up under various names: The following formula makes a satisfactory preparation for most purposes.

Acetanilide, in very fine powder,	4 ounces
Boric Acid, in very fine powder,	4 ounces
Zinc Oxide, in fine powder,	1 ounce

Mix them intimately. This may be used as a dusting powder to irritated surfaces or an application to wounds or sores as an absorbent dressing.

Listerine.

This is a proprietary medicine used as an antiseptic solution and claimed to contain the essential antiseptic properties of thyme, eucalyptus, baptisia and mentha arvensis, combined with benzoic and boric acids.

A great number of preparations similar to this but with different names are put out by manufacturing pharmacists. This has been one of the most popular antiseptic preparations for all uses. As a tooth wash it is extensively used; as a lotion and for all external applications in all ways it is popular; and as a cleansing injection, diluted with 10 times its volume of water.

The following formula was published originally in Fenner's Complete Formulary, but is not claimed to be the formulæ of the original:

Boric Acid,	128 grains
Benzoic Acid,	64 grains
Baptisin,	20 grains
Thymol,	20 grains
Eucalyptol,	10 grains
Menthol,	10 grains
Oil of Wintergreen,	5 minims
Glycerin,	1 fl.ounce
Alcohol,	2 fl.ounces
Water, sufficient to make	1 pint

Mix the boric acid with the glycerin and water, add the other ingredients to the alcohol, and after standing 24 hours, add the aqueous solution to the alcoholic, and after standing, filter.

Dobell's Solution.

Carbolic Acid crystals,	90 grains
Sodium Bicarbonate,	10 grains
Borax, in powder,	120 grains
Glycerin,	2 ounces
Water,	2 pints

Mix, dissolve and filter. This is used as an insufflation for nasal catarrh, and as a cleansing injection.

APERIENTS.

Aperients, as they are known in medicine, are mild laxative or purgative preparations. There are but few proprietary preparations on the market having the title "Aperient," although many with other titles have aperient properties. Probably the best known aperient is Tarrant's Seltzer Aperient.

Magnesium Aperient or Seltzer Aperient. Several magnesian or seltzer aperients have had a large sale as proprietary medicines. The following formula makes a preparation similar to those most popular:

Magnesium sulphate 1 pound av., dry it by gradually increasing heat until it has lost one-third of its weight; then add tartaric acid, dried and powdered, 10 ounces av., magnesia (calcined) 8 ounces av., white sugar 24 ounces av., sodium bicarbonate, dried and powdered, 8 ounces av. Mix them all well together and pass through a sieve.

Another formula is: Magnesium carbonate 1 pound, sodium bicarbonate 1 pound, Rochelle salts 2 pounds, tartaric acid 2 pounds. Mix.

Many of the Effervescing Salts are aperients, and many of the liquid laxatives are known as aperients, but they do not generally bear that title. See Laxatives, Cathartics, Effervescing Salts, Cordials etc., for formulas for other aperient preparations.

APHRODISIACS.

A few medicines designed to stimulate the sexual functions are found upon the market, and are known as "Mormon Elder's Damiana Tonic," "Damiana Wafers," and by other titles. The following formulas make good preparations:

Damiana Tonic.

Damiana Leaves, in No. 40 powder,	24 ounces
Life Root Plant, (Senecio), in No. 40 powder,	4 ounces
Saw Palmetto Berries,	2 ounces
Canada Snake Root,	4 ounces

Nux Vomica,	120 grains
Iron Phosphate, in scales,	2 ounces
Alcohol,	4 pints
Sugar,	2 pounds
Water,	5 pints

Macerate the drugs with the alcohol mixed with 2 pints of water, and after 24 hours transfer to a percolator (water-bath preferable) and percolate, adding the remainder of the water through the percolator.

Dissolve the iron and add to the percolate, filter and dissolve the sugar by agitation. Dose a dessertspoonful 3 times daily.

Damiana Wafers or Lozenges.

Extract of Damiana,	3 ounces
Extract of Nux Vomica,	30 grains
Extract of Saw Palmetto,	240 grains
Iron Phosphate,	240 grains
Extract of Gentian,	4 ounces
Sugar, in powder,	4 ounces

Mix the extracts and incorporate the iron in powder, with the mass, then add the sugar and enough water to make into a mass, which divide into 500 thin lozenges. Dose 3 each day.

Yohimbe Compound.

Fluidextract Yohimbe bark,	1 ounce
Fluidextract Damiana leaves,	2 ounces
Fluidextract Saw Palmetto berries,	1 ounce
Glycerin,	4 ounces
Alcohol,	4 ounces
Water,	4 ounces

Mix, and after standing, filter. Dose a dessertspoonful.

Yohimbe is a new drug said to be much more powerful than damiana as an aphrodisiac.

Anaphrodisiacs. These are medicines intended to quiet undue sexual desire or excitement. No special proprietary remedies are put up for that purpose, but, in a general way, analgesics and nerve sedatives are prescribed.

ASTHMA AND HAY FEVER REMEDIES.

The asthma remedies which are put up as proprietary are in various forms, as powders and pastilles for burning slowly, the smoke being inhaled, cigarettes for smoking, remedies to take, and inhalants. The design of most of them is to produce diaphoresis and expectoration as well as to subdue the spasmodic action of the inflamed bronchial organs. The following formulas make preparations representative of the various remedies.

Asthma Remedy.**A Powder for Fumigation.**

Grindelia Robusta, in fine powder,	8 ounces
Jaborandi Leaves, in fine powder,	8 ounces
Eucalyptus Leaves, in fine powder,	4 ounces
Coca Leaves, in fine powder,	4 ounces
Digitalis Leaves, in fine powder,	4 ounces
Cubeb, in fine powder,	4 ounces
Stramonium Leaves, in fine powder,	16 ounces
Potassium Nitrate, in fine powder,	12 ounces
Cascarilla Bark,	1 ounce

Mix the powders and dry them thoroughly before putting up. This is used by burning a half-teaspoonful or more on a piece of saltpetre paper and inhaling the smoke which rises. It affords prompt relief and will cure cases not too far advanced. It is also excellent for catarrh, hay-fever, and other troubles of the nasal passages, throat and lungs.

Asthma Cure.**A Liquid to Take.**

Fluidextract Grindelia,	3 fl.ounces
Fluidextract Skunk Cabbage,	1 fl.ounce
Fluidextract Lobelia,	1 fl.ounce
Fluidextract Bloodroot,	2 fl.drachms
Fluidextract Senega,	2 fl.drachms
Alcohol,	20 fl.ounces
Water,	6 fl.ounces

Mix them thoroughly and, after standing, decant or filter.

This may also be prepared from the drugs, grindelia 3 ounces, skunk cabbage, lobelia, each, 1 ounce; senega and bloodroot, each, 2 drachms; percolated with a mixture of 4 measures of alcohol with 1 measure of water, sufficient to make 2 pints, and chloroform 1 fl.ounce, added to the tincture.

The dose is a tablespoonful, in sweetened water, every 15 or 30 minutes, when the attack of asthma comes on, until relieved. It should also be continued in small doses, three times a day to effect a cure.

Asthma Relief.**To Take for Asthma, Hay-Fever Etc.**

Amyl Nitrite,	2 fl.drachms
Potassium Iodide,	1 ounce av.
Elixir,	1 pint

Mix and dissolve. The dose is a teaspoonful for asthma, at the first indications of the paroxysm, repeated every 20 or 30 minutes until relieved. For hay-fever, influenza etc., a teaspoonful every 3 or 4 hours.

Asthma Inhalant.

To be used by Inhalation.

Amyl Nitrite,	2	fl.drachms
Essential Oil of Mustard,	10	minims
Ether,	$\frac{1}{2}$	fl.ounce.
Alcohol,	4	fl.ounces

Mix them. Put a few drops of the liquid upon some cotton or sponge, hold in the hand and inhale the vapor. It is still better to put the cotton loosely in a glass tube or homœopathic bottle with the bottom out and inhale by drawing the air through the tube. This gives immediate relief. Other forms of inhalers may be used.

Asthma Pastilles.

Benzoin, in fine powder,	1	ounce av.
Jaborandi, in fine powder,	2	ounces av.
Stramonium Leaves, in fine powder,	4	ounces av.
Potassium Nitrate, in fine powder,	4	ounces av.
Charcoal,	20	ounces av.

Mucilage of Tragacanth, thin, sufficient.

Beat the powders with the mucilage to a stiff mass and roll out into a cake about $\frac{1}{4}$ inch thick, cut this into strips $\frac{1}{8}$ inch wide and $1\frac{1}{2}$ inches long and dry by warm air, or make the mass into cones of about 60 grains weight.

One end of the pastil is ignited and the smoke inhaled until relieved.

Asthmatic Cigarettes.

Stramonium Leaves,	4	ounces
Cascarilla Bark,	$\frac{1}{2}$	ounce
Lobelia Leaves,	2	drachms
Mullein Leaves,	4	ounces

Cut the leaves and drugs fine like smoking tobacco and make into cigarettes. This may also be smoked in a pipe.

Asthma Vaporizing Remedy.

A remedy for asthma to be used with an atomizer has proven very successful. The solution may be made as follows:

Bonjean's Ergotin,	$\frac{1}{2}$	ounce
Formaldehyde, (40%),	10	minims
Water,	$3\frac{1}{2}$	ounces

Rub the ergotin with the water and add the formaldehyde. This is to be used with an atomizer. It is also a prompt remedy for hay-fever.

Adrenaline chloride, solution, 1:1000, $\frac{1}{4}$ ounce, added to the above, is very effective.

BALMS OR PANACEAS.

In proprietary medicines Balms are remedies intended for internal or external uses, and designed to allay pains, colic, cholera-morbus,

inflammation etc. The following will be found satisfactory and similar in composition to those most popular in the market, known as Magic Balms, Pain Killers, Ready Reliefs, Magic Oils etc. They are, as a class, hot, stimulating preparations, increasing the circulation of the blood to the parts where they are applied, or acting as counter irritants, and thus acting on the Indian principle, frightening away the disease. They are sold as general panaceas for pain etc. Many other similar preparations for internal and external use will be found among Liniments and other headings. The sale for this class of preparations as proprietary remedies is as large as nearly any other class, and they may be readily prepared by druggists, affording a good profit.

Eucalyptus Balm.

Oil of Eucalyptus,	1 fl.ounce
Oil of Cloves,	$\frac{1}{4}$ fl.ounce
Oil of Hemlock,	$\frac{1}{2}$ fl.ounce
Capsicum,	$\frac{1}{2}$ ounce av.
Camphor,	$\frac{1}{2}$ ounce av.
Alcohol,	1 pint

Mix them, macerate for a week or ten days, agitating occasionally, and filter.

Magic Balm.

Oil of Sassafras,	1 fl.ounce
Oil of Cloves,	$\frac{1}{4}$ fl.ounce
Oil of Hemlock,	$\frac{1}{2}$ fl.ounce
Chloroform,	$\frac{1}{8}$ fl.ounce
Ether,	$\frac{1}{2}$ fl.ounce
Capsicum,	$\frac{1}{2}$ ounce av.
Camphor,	$\frac{1}{2}$ ounce av.
Water of Ammonia,	$\frac{1}{2}$ fl.ounce
Alcohol,	1 pint

Mix them. Macerate for a week or ten days, agitating frequently and filter.

Magnetic Balm.

Oil of Sassafras,	1 fl.ounce
Oil of Peppermint,	$\frac{1}{4}$ fl.ounce
Oil of Hemlock,	1 fl.ounce
Capsicum,	$\frac{1}{2}$ ounce av.
Camphor,	$\frac{1}{2}$ ounce av.
Alcohol,	1 pint

Mix them. Macerate for a week or ten days, agitating frequently and filter.

Pain Cure Balm or "Pain Killer."

Guaiac Resin,	I ounce av.
Capsicum,	$\frac{1}{2}$ ounce av.
Camphor,	$\frac{1}{8}$ ounce av.
Opium, in powder,	60 grains
Water of Ammonia,	$\frac{1}{4}$ fl.ounce
Alcohol,	I pint

Mix them. Macerate for a week or ten days and filter. This is similar to some of the Pain Killers.

The preparation known as No. 6, or Tincture of Myrrh and Capsicum, is often put up as a pain killer.

Ready Balm or "Ready Relief."

Camphor,	$\frac{1}{2}$ ounce av.
Capsicum,	$\frac{1}{2}$ ounce av.
Oil of Turpentine,	$\frac{1}{4}$ fl.ounce
Water of Ammonia,	5 fl.ounces
Alcohol,	12 fl.ounces

Dissolve the camphor and oil of turpentine in the alcohol, add the capsicum and ammonia, and after standing a week or ten days, filter rapidly. This is similar to Ready Relief. It should be given internally only in small doses, 10 to 20 minims.

Wizard Balm or "Wizard Oil."

Oil of Cajuput,	$\frac{1}{4}$ fl.ounce
Oil of Sassafras,	I fl.ounce
Oil of Hemlock,	$\frac{1}{4}$ fl.ounce
Oil of Origanum,	$\frac{1}{4}$ fl.ounce
Oil of Cedar,	$\frac{1}{8}$ fl.ounce
Capsicum,	$\frac{1}{4}$ ounce av.
Camphor,	$\frac{1}{4}$ ounce av.
Chloroform,	$\frac{1}{4}$ fl.ounce
Alcohol,	I pint

Mix them. Macerate for a week and filter.

BALSAMS.

Many proprietary preparations, called "Balsams," are classed with other remedies, as "Cough Balsam" or "Lung Balsam," among the cough remedies; "Carminative Balsam," "Diarrhœa Balsam" etc., under cholera cures etc.

Others are included under other headings throughout the book. The few remaining unclassified, and known more particularly as Balsams, are noted in this department.

Several Balsams, also, which are put up as proprietary remedies, will be found on other pages of this work.

Anodyne Balsam.

For External Use.

Castile Soap,	1 ounce
Opium Tincture,	3 ounces
Camphor,	3 drachms
Alcohol,	10 ounces

Cut the soap in fine pieces and digest by gentle heat, with the tincture of opium and alcohol until dissolved, then add the camphor, dissolve and filter.

This is intended for external use in swellings, pain etc.

Canker Balsam.

Marsh Rosemary Root, in coarse powder,	4 ounces av.
Borax, in powder,	1 ounce av.
Glycerin,	6 ounces av.
Alcohol,	12 fl.ounces

Water, a sufficient quantity.

Mix alcohol and water, equal measures, and percolate the marsh rosemary root with the liquid until it ceases to drop, then add sufficient water through the percolator to make 27 fl.ounces of the percolate, dissolve the borax in the liquid, add the glycerin, and filter.

This is an astringent liquid, useful as a gargle for sore throat, a mouth wash etc., and as an application for cracked nipples or other similar sores.

Caustic Balsam.

A preparation known as Gombault's Caustic Balsam has had an extensive sale for veterinary use etc. The following formula makes a preparation quite similar to the proprietary article.

Sulphuric Acid, (by weight),	1 ounce av.
Croton Oil,	60 grains
Corrosive Sublimate,	6 fl.ounces
Oil of Turpentine,	6 fl.ounces
Camphor,	$\frac{1}{2}$ ounce
Cotton Seed Oil,	8 fl.ounces

Mix the oils of turpentine and croton, add the corrosive sublimate in fine powder and the camphor, and dissolve; then add, a little at a time, the sulphuric acid, taking care that the mixture does not become too hot, and, when all has been added and the mixture has become cool, add the cotton seed oil and mix them thoroughly.

This is used for sprains, ringbones, strains, swellings, puffs etc.

Locatelle's Balsam.

Yellow Wax,	4 ounces
Olive Oil,	1 pound
Venice Turpentine,	1 pound
Alkanet Root,	2 ounces

Steep the alkanet root for several days in the olive oil and strain, melt the wax, add the oil and turpentine and mix them well together. This is used as a pectoral in doses of $\frac{1}{2}$ to 1 teaspoonful.

Thibault's Balsam.

Myrrh, Aloes and Dragon's Blood, each,	1	drachm
St. John's Wort Flowers,	1	ounce
Spirit of Wine, (Alcohol),	10	ounces
Canada Balsam,	$\frac{1}{2}$	ounce

Digest the flowers in the spirit for three days, then express the liquor and dissolve it in the other ingredients and, after standing, filter.

This is used as a healing balsam for wounds, cuts etc., and is given as a diuretic and for kidney and bladder troubles, gonorrhœa etc., in doses of a teaspoonful or more.

Turlington's Balsam.

Benzoin,	12	ounces
Storax, (liquid),	4	ounces
Balsam Peru,	2	ounces
Myrrh,	1	ounce
Aloes,	1	ounce
Balsam Tolu,	4	ounces
Extract Liquorice,	4	ounces
Angelica Root,	$\frac{1}{2}$	ounce
Alcohol,	1	gallon

Reduce the gums to a coarse powder and macerate all together with the spirit for two weeks, with agitation, then filter.

This has been a popular panacea for internal and external use.

Friar's Balsam, quite similar to this, is tincture of benzoin compound, official in all countries.

Vegetable Healing Balsam.

White Resin,	1	pound av.
Oil of Turpentine,	1	pint

Melt the resin, remove it from the fire and add the oil of turpentine, mixing them well together.

This is similar to **Peckham's Balsam**, as it is now put up and sold as a proprietary medicine. It is used for coughs and colds, also for kidney and bladder troubles, in doses of 3 to 10 minims or more. It is also used externally on sores, wounds, swellings etc.

The following is said to be the formula from which this balsam was formerly prepared: Pale resin 3 pounds, melted if necessary, and strained; then add oil of turpentine 2 pints, balsam of Tolu 1 ounce, balsam of fir 4 ounces, oil of hemlock, oil of origanum, Venice tur-

pentine, each, 1 ounce; strained honey 4 ounces. Mix them well together.

Similar "Vegetable Healing Balsams" are also prepared by others and sold under similar names.

The following formulas may be used:

Burgundy Pitch,	1¼ pound av.
Oil of Turpentine,	1 pint

Melt the pitch, remove from the fire and gradually add the oil of turpentine, mixing them well together.

Resin,	1 pound
Venice Turpentine,	1 pound
Oil of Turpentine,	1 pint

Melt the resin, add the Venice turpentine, warm together and add the oil of turpentine while cooling.

Resin,	1 pound
Balsam Fir,	½ pound
Venice Turpentine,	½ pound
Oil of Turpentine,	1 pint

Melt the resin and the balsam of fir and Venice turpentine, warm together and, while cooling, add the oil of turpentine, mixing them well together.

Other oils and balsams may be incorporated with the resin and oil of turpentine in the same manner as the foregoing.

BITTERS.

Among proprietary medicines bitters hold an important place, and many colossal fortunes have been amassed by the manufacturers of these nostrums.

The preparations sold under the name of bitters vary greatly in composition and strength, but all are intended to stimulate the appetite and in a greater or less degree regulate the digestive functions and strengthen the system by imparting tone to the various organs.

A great variety of bitters are sold under various names as proprietary medicines. They are designed for various uses, and may naturally be divided into three classes, as follows.

Class A.

These bitters are weakly medicinal preparations designed to be taken in large doses, and depend for their effect more upon the liquor which they contain than the other medicinal ingredients. They are stimulating bitters, and are to a great extent substitutes for liquors, although if properly used are very beneficial for disordered digestion, dyspepsia, malaria etc. The most popular bitters of this class found in the market are Hostetter's, Wahoo, Niagara etc. The following formulas make good preparations of this kind;

Stomach Bitters.

Bitter Orange Peel,	2 drachms
Wahoo Bark,	2 drachms
Sweet Flag Root,	1 drachm
Cinnamon Bark,	1 drachm
Cloves,	10 grains
Coriander,	30 grains
Whiskey,	6 pints
Sugar,	2 ounces
Water,	2 pints

Reduce the drugs to a coarse powder and macerate with the whiskey and water for several days until the strength is obtained, then filter. If desired, cologne spirit (alcohol proof) may be diluted with an equal quantity of water and used instead of whiskey.

Fluidextracts of the drugs of the same fluid measure as is directed of weight may be used instead of the drugs, if desired. Filter before putting up. The dose is half a wineglassful or more.

Hop Bitters.

Hops, in coarse powder,	3 ounces av.
Buchu, in coarse powder,	1 ounce av.
Dandelion Root, in coarse powder,	1 ounce av.
Mandrake Root, in coarse powder,	80 grains
Bitter Orange Peel, in coarse powder,	2 drachms
Wahoo Bark,	1 drachm
Whiskey,	5 pints
Water, q. s., or	3½ pints

Mix the whiskey with 3 pints of water and macerate the drugs with the mixture for several days, then filter and add through the filter enough water to make the measure a gallon.

Fluidextracts of the drugs of the same measure as is directed of weight may be used instead of the drugs if desired. Filter before putting up. The dose is a tablespoonful or more.

This is much stronger of the medicinal ingredients than the proprietary hop bitters. It may be reduced with diluted cologne spirit.

Wahoo Bitters.

Wahoo Bark, in coarse powder,	½ ounce
Orange Peel, fresh,	½ ounce
Sweet Flag Root,	¼ ounce
Cinnamon Bark, in coarse powder,	1 drachm
Cardamom Seed, in coarse powder,	20 grains
Whiskey,	6 pints
Glycerin,	1 ounce
Water,	2 pints

Mix and macerate for several days, then filter.

Fluidextracts of the drugs, the same fluid measure as is directed of weight, may be used instead of the drugs if desired. Filter before putting up.

Dose from half to a wineglassful or more.

Other bitters of this class may be made in the same general way by using other bitter drugs, other liquors, or other flavoring ingredients.

Plantation Bitters.

Wild Ginger Root,	½ ounce
Bitter Orange Peel,	1 ounce
Dandelion Root,	1 ounce
New England Rum,	1 pint
Whiskey,	5 pints
Sugar,	4 ounces
Water,	2 pints

Reduce the drugs to a coarse powder and macerate with the mixed liquids for a few days, then filter.

Fluidextracts of the drugs, the same fluid measure as is directed of weight, may be used instead of the drugs if desired. Filter before putting up.

Class B.

This class of bitters includes those in which iron is combined with bitter tonics, aromatics etc., in the form of a pleasant cordial. Iron bitters have, by reason of extensive advertising, become quite popular and, although they are nothing new in the line of preparations, they have a large sale and, as they may be made at a low cost, are quite profitable to put up. In making these bitters it is necessary to use tonics and aromatics which do not make an inky color or taste with the iron salts.

Iron Bitters.

Tonic Health Cordial.

Wahoo Bark, in coarse powder,	1 ounce av.
Cardamom Seeds, in coarse powder,	2 drachms
Caraway Seeds, in coarse powder,	2 drachms
Coriander Seeds, in coarse powder,	2 drachms
Nutmeg, in coarse powder,	1 drachm
Orange Peel, fresh,	2 ounces
Oil of Cassia, (Cinnamon),	10 minims
Citrate of Iron and Ammonium,	1 ounce av.
Sugar,	1 pound
Cologne Spirit, (Deodorized Alcohol),	2 pints
Water, sufficient to make	1 gallon

Mix the powdered drugs and macerate them with the alcohol, with frequent agitation, for several days, then pour off the liquid, add the

oils to the tincture and reserve. Now add 2 pints of water to the macerated powders, agitate, let stand 12 hours and pour off; repeat with the same quantity of water, adding the aqueous liquids to the alcoholic solution and mixing them thoroughly; dissolve the iron salt and the sugar in enough water to make, when added to the mixed liquids, 1 gallon of the mixture and, after standing a few days, filter clear.

This may be made, also, by mixing 1 fl.ounce of fluidextract of wahoo with 3 fl.ounces compound tincture of cardamom and the other ingredients as directed in the above formula.

Other soluble salts of iron may be used instead of the citrate.

The dose is a dessertspoonful to a wineglassful.

Iron Wine Bitters.

Bitter wine of iron is frequently put up and sold as Iron Bitters, but is stronger than most that are put up for general sale. The following makes a good iron bitters, using wine as the menstruum:

Iron and Quinine Citrate,	1	ounce av.
Essence of Calamus,	1	fl.ounce
Oil of Cinnamon,	10	minims
Oil of Orange,	40	minims
Sugar,	8	ounces av.
Water, (hot),	4	fl.ounces
Alcohol,	1	pint
White Wine, (Sherry or Angelica),	6½	pints

Dissolve the iron and quinine citrate in the hot water and add the solution to the wine, dissolve the oils in the alcohol and add the essence, then mix the solutions, dissolve the sugar in the mixture and, after standing, filter.

The dose is a dessertspoonful to a wineglassful.

Class C.

In this class the formulas are given for the stronger medicinal bitters, similar to proprietary bitters, which have been or are popular. They differ from other classes of bitters by being put up in smaller packages, containing more of the medicinal agents and being taken in smaller doses.

Blood Bitters or Burdock Bitters.

Tonic System Regulator.

Burdock Root,	12	ounces av.
Mezereum Bark,	2	ounces av.
Wild Cherry Bark,	2	ounces av.
Senna Leaves,	2	ounces av.
Colombo Root,	1	ounce av.
Sassafras Bark,	2	ounces av.

Liquorice Root,	2 ounces av.
Cinnamon,	$\frac{1}{2}$ ounce av.
Cloves,	$\frac{1}{4}$ ounce av.
Sugar,	4 ounces av.
Alcohol,	4 pints
Water, a sufficient quantity to make	1 gallon

Grind the drugs to a coarse powder, mix the alcohol with 3 pints of water, moisten the powder with a pint of the mixture and macerate in a warm place, in a covered vessel for 24 hours; transfer to the water-bath percolator, pour upon it 2 pints of menstruum, pack moderately, and set in a warm place for 1 day, then heat very moderately and, after 1 hour, begin to percolate, adding the remainder of the menstruum, and then water to the drug, and continuing the heat and percolation until a gallon of the bitters is obtained; dissolve the sugar in the liquid and filter.

This may be made by cold percolation, but this method does not so thoroughly exhaust the drugs.

The dose is from 1 to 2 teaspoonfuls three or four times a day.

This is similar to, but a better preparation than several of the Blood Bitters on the market.

German Liver Bitters.

Leptandra, (Culver's Root),	8 ounces av.
Mandrake Root,	2 ounces av.
Burdock Root,	6 ounces av.
Liquorice Root,	2 ounces av.
Sassafras Bark,	2 ounces av.
Cinnamon Bark,	$\frac{1}{2}$ ounce av.
Alcohol,	4 pints
Water, a sufficient quantity.	

Grind the drugs to a coarse powder, mix the alcohol with 4 pints of water, moisten the powder with a pint of the menstruum and macerate in a covered vessel for 24 hours; transfer to the water-bath percolator, pack firmly, pour upon it 2 pints of the menstruum and set in a warm place for 1 day, then heat moderately and, after 1 hour, begin to percolate, adding the remainder of the menstruum, and then water to the drugs, and continuing the heat and percolation until a gallon of the bitters is obtained, filter.

This may be made also by cold percolation but this process does not so thoroughly exhaust the drugs.

Fluidextracts of the drugs, the same fluid measure as is directed of weight, may be used instead of the drugs, if desired. Filter before putting up.

The dose is from 1 to 2 teaspoonfuls three or four times a day.

This is similar to the German bitters and liver invigorators that have been popular. The preparation is a good liver and blood remedy.

A great variety of similar preparations are put up and sold under various names, all of them being intended to act on the liver to increase its secretion of bile, thereby acting as a laxative. The sale of this kind of bitters is much less than formerly, but they are, nevertheless, good preparations:

Jaundice or Laxative Bitters.

Cape Aloes, in powder,	2	ounces av.
Potassium Carbonate, (Sal Tartar),	$\frac{1}{2}$	ounce
Culver's Root, in powder,	2	ounces av.
Cinnamon, in powder,	1	ounce
Anise, in powder,	1	ounce
Coriander, in powder,	1	ounce
Liquorice Root, in powder,	2	ounces
Alcohol,	2	pints
Water, sufficient to make	1	gallon

Mix the drugs and macerate them with the alcohol and 6 pints of water for 7 days, then pour off the supernatant liquid, put the drugs in a percolator, pour the liquid upon them and percolate, adding water through the percolator until a gallon of bitters is obtained, filter.

Fluidextracts of the drugs, the same fluid measure as is directed of weight, may be used instead of the drugs, if desired. Filter.

This is similar to several laxative and jaundice bitters on the market which have had a popular sale.

Poor Man's Bitters.

A class of bitters made with a small percentage of alcohol, and put up usually in half-pint bottles, to retail at 25 cents, are known by the above title and various other names. They are neither very profitable nor satisfactory proprietary medicines, but may be made, if desired, as follows:

Quassia, ground,	4	ounces
Cloves, in powder,	$\frac{1}{4}$	ounce
Capsicum,	$\frac{1}{8}$	ounce
Orange Peel, ground,	1	ounce
Cinnamon, in powder,	$\frac{1}{4}$	ounce
Alcohol,	$1\frac{1}{2}$	pints
Water, q. s., about	7	pints

Mix the powders with the ground drugs and, having mixed the alcohol with $1\frac{1}{2}$ pints of water, moisten the drugs with 6 fl.ounces of the mixture, and pack it in a water-bath percolator, pour upon them the remainder of the alcohol and water, and after 24 hours heat moderately for 1 hour and percolate, adding water through the percolator to make 1 gallon of the bitters; after standing, filter.

Fluidextracts of the drugs, the same fluid measure as is directed of weight, may be used instead of the drugs if desired. Filter.

The dose is a tablespoonful or more.

Mandrake Bitters may be made by adding 2 ounces of mandrake to the above.

Bitters in Powder.

Gentian, in fine powder,	4 ounces
Golden Seal, in fine powder,	4 ounces
Black Cohosh, in fine powder,	2 ounces
Rhubarb, in fine powder,	1 ounce
Cinnamon, in fine powder,	$\frac{1}{2}$ ounce
Nutmeg, in fine powder,	1 ounce
Aloes, in fine powder,	1 ounce
Sodium Bicarbonate,	$\frac{1}{2}$ ounce
Ginger, in fine powder,	$\frac{1}{4}$ ounce

Mix thoroughly. This is to be put in boxes or packages of about 1 ounce which sell generally for 25 cents.

The contents of the package is to be put into $\frac{3}{4}$ of a pint of water and $\frac{1}{4}$ pint of alcohol; a tablespoonful is to be taken before meals.

A much cheaper bitters powder, which has had a good sale under various names, may be made with

Aloes, in fine powder,	8 ounces
Canella, in fine powder,	8 ounces
Lupulin, in fine powder,	$\frac{1}{2}$ ounce
Cassia, in fine powder,	$\frac{1}{2}$ ounce

Mix them. To take, prepare as above, using only one-half the quantity of powder.

BLOOD PURIFIERS.

All preparations which are put up for purifying the blood may be properly classed as blood purifiers; yet there but few proprietary preparations on the market bearing that title. The sarsaparillas, the alteratives, some of the bitters, and many other preparations are blood purifiers, and if that title is chosen by those who wish to put up a preparation, it may properly be used for putting up such a preparation. The following formula makes a very good liquid blood purifier:

Burdock Root,	8 ounces av.
Stillingia,	8 ounces av.
Sarsaparilla,	8 ounces av.
Senna Leaves,	4 ounces av.
Sassafras Bark,	2 ounces av.
Potassium Iodide,	1 ounce av.
Oil of Wintergreen,	20 minims
Sugar,	1 pound
Alcohol,	$3\frac{1}{2}$ pints
Water, sufficient to make	1 gallon

Grind the drugs to a coarse powder and, having mixed a pint of the alcohol with a pint of water, macerate them for 24 hours with the liquid; then pack in a percolator, mix the remaining $2\frac{1}{2}$ pints of alcohol with an equal measure of water and pour upon the drugs; set in a warm place for 24 hours, then percolate slowly, adding water to the drugs after the liquid has all disappeared from the surface, and continuing the percolation until $7\frac{1}{2}$ pints have passed. Dissolve the oil of wintergreen in half an ounce of alcohol and add the solution, with the sugar and iodide of potassium, to the percolate. Dissolve and filter.

Fluidextracts of the drugs, the same fluid measure as is directed of weight, may be used instead of the drugs, if desired. Filter.

The dose is a teaspoonful to a tablespoonful.

This may be put up as blood purifier, blood cleanser, blood tonic, or by any other similar title.

Blood Purifying Tea.

This mixture of cut roots and barks is designed to be steeped. It is a very popular form of medicine, much used by the poorer classes, as it is less expensive than the put up liquid medicine.

It may be put up in packages holding 2 ounces, which will be sufficient to make a quart of blood purifier, when steeped with water.

Burdock Root, cut or granulated,	4 ounces
Sassafras Root, cut or granulated,	1 ounce
Blue Flag Root, cut or granulated,	1 ounce
Dandelion Root, cut or granulated,	3 ounces
Sarsaparilla Root, cut or granulated,	4 ounces
Wild Cherry Bark, cut or granulated,	2 ounces
Yellow Dock Root, cut or granulated,	1 ounce

Mix thoroughly and put up in packages of about 2 ounces.

Directions for preparing: Steep the contents of the package in 3 pints of water, with gentle heat, for 2 hours, strain off $1\frac{1}{2}$ pints into a quart bottle and add half a pint of alcohol and 4 ounces of sugar. The dose is a wineglassful for adults, before meals and at bedtime; children in proportion, according to age.

CARMINATIVES.

Carminatives are mild, aromatic, astringent preparations intended to be used for diarrhoea, summer complaints and like disorders. They are particularly adapted to children, being mild, pleasant to take, and effective. Other preparations of a similar nature will be found under other headings. See also Cholera Cures, Dysentery Remedies etc.

Blackberry Carminative.

Blackberry Juice,	4 pints
Tincture of Opium,	3 fl.ounces
Fluidextract of Blackberry,	8 fl.ounces

Fluidextract of Wild Yam,	2 fl.ounces
Oil of Cinnamon,	30 minims
Oil of Nutmeg,	20 minims
Oil of Sassafras,	30 minims
Sugar,	2 pounds
Alcohol,	2 pints
Water, sufficient to make	1 gallon

Mix the fluidextracts with the juice and dissolve the sugar in the mixture by agitation. Dissolve the oils in the alcohol and add to the mixture, then add enough water to make a gallon of the preparation and, after standing a few days, filter.

Dose for children, from half to a teaspoonful; for adults, from a teaspoonful to a tablespoonful.

Ginger Carminative or Carminative Cordial.

Jamaica Ginger, in No. 40 powder,	6 ounces av.
Blackberry Root, in No. 40 powder,	1 pound
Cinnamon, in No. 50 powder,	1 ounce
Nutmeg, in No. 50 powder,	1 ounce av.
Sassafras, in No. 40 powder,	1 ounce av.
Tincture of Opium,	4 fl.ounces
Sugar,	2 pounds
Alcohol,	3 pints
Water, sufficient to make	1 gallon

Mix the powdered drugs and, having mixed the alcohol with 3 pints of water, moisten the drugs with 2 pints of the liquid and macerate in a closed vessel for 24 hours; then pack in a percolator, pour the remainder of the liquid upon it and, after standing 1 day, percolate, adding water through the percolator after the liquid has disappeared from the surface, and continue the percolation until 6 pints are obtained; add the tincture of opium and filter, and to the filtrate add the sugar and, after the sugar is dissolved, enough water to make 1 gallon.

Dose for children, from half to a teaspoonful; for adults, a teaspoonful to a tablespoonful.

CATARRH REMEDIES.

A great variety of widely different remedies for catarrh are found upon the market—medicines to take, inhalers, sprays, salves, creams, ointments, oil and lotions to apply, powders to dissolve and insufflate, plugs to insert in the nostrils, cigarettes and cut herbs to smoke, and powders to snuff—all present their claims for public favor.

Besides these are the general remedies which are *taken* for catarrh, which will be found under other headings, as alteratives, blood purifiers, tonics etc. The following are given as representatives of those particularly recommended for catarrh:

Birney's Catarrhal Powder.

The formula for this powder is given by Dr. Eccles as follows:

Cocaine Hydrochloride,	19 grains
Magnesium Carbonate,	18 grains
Peppermint Leaves, in powder,	5 grains
Milk Sugar, enough to make	1 ounce

Rub them together to a fine powder, and use as a snuff.

Catarrh Remedy.

Liquid for Insufflation.

Fluidextract of Hydrastis, (Aqueous), or "Fluid Hydrastis,"	3 fl.ounces
Carbolic Acid,	2 drachms
Zinc Sulphate,	4 drachms
Morphine Sulphate,	10 grains
Glycerin,	8 fl.ounces
Water,	5 fl.ounces

Mix them. To use—put i teaspoonful of common salt in a small cup of water, add a teaspoonful or more of the remedy and use by insufflation or with a douche. This also makes an excellent gargle for sore throat etc.

Catarrh Remedy — Powder.

Golden Seal, in fine powder,	4 ounces
Potassium Chlorate, in fine powder	1 ounce
Zinc Sulphate,	2 drachms
Morphine Sulphate,	10 grains
Salicylic Acid,	10 grains

Mix them well together. A teaspoonful of this powder and 2 teaspoonfuls of salt added to a pint of boiling water makes a liquid to be used with a douche or by insufflation.

Catarrhal Balm.

Boric Acid, in fine powder,	120 grains
Salicylic Acid, in fine powder,	30 grains
Bismuth Subcarbonate,	120 grains
Menthol,	10 grains
Petrolatum,	4 ounces

Rub the powders together with the menthol and, having melted the petrolatum, while it is cooling incorporate the powder and stir until it becomes solid.

Catarrholeum — Catarrh Oil.

Oil of Eucalyptus,	2 fl.drachms
Oil of Tar,	2 fl.drachms
Thymol,	60 grains

Menthol,	10 grains
Naphthalin,	60 grains
Liquid Petrolatum,	12 ounces

Heat about 2 ounces of the liquid petrolatum moderately in a capsule or wide-mouthed bottle and add the naphthalin; when it is liquefied add the thymol and menthol, then the oil of eucalyptus and the balance of the liquid petrolatum.

The liquid petrolatum is now official and is known commercially as paraffin oil (refined), or mineral glycerin; also as alboline etc.

Katona Catarrh Cure.

A Remedy to take for Catarrh and Hay Fever.

Compound Tincture of Gentian,	4 fl.ounces
Fluidextract of Stillingia,	2 fl.ounces
Fluidextract of Golden Seal,	1 fl.ounce
Iodide of Potassium,	$\frac{1}{2}$ ounce
Elixir, enough to make	16 fl.ounces

Mix the tincture and the fluidextracts, add 9 ounces of the elixir and dissolve the iodide of potassium in the mixture, then filter and add through the filter enough elixir to make the measure 16 fl.ounces.

Camphorated Cream Salve.

For Catarrh Etc.

Camphor, in coarse powder,	80 grains
Carbolic Acid,	60 grains
Oil of Eucalyptus,	2 fl.drachms
Tincture of Aconite Root,	2 fl.drachms
Yellow Wax,	2 ounces av.
Petrolatum,	16 ounces av.

Melt the wax and petrolatum together, mix the camphor, carbolic acid, oil of eucalyptus and tincture of aconite and, when the camphor is dissolved, add the mixture to the melted mass while cooling. This may also be used as an ointment for chillblains, chaps etc., and whenever a soothing, healing ointment is desired.

Catarrh Cream Balm.

Tincture of Aconite,	2 fl.drachms
Carbolic Acid, (crystals),	1 drachm
Oil of Sassafras,	30 minims
Menthol,	30 grains
White Pine Turpentine,	2 drachms
Yellow Wax,	2 ounces av.
Petrolatum,	16 ounces av.

Melt the wax, turpentine and petrolatum together and, when cooling, add the tincture, carbolic acid, menthol and oil, mixing them well together.

Catarrh Cure or Salve.

Oil of Tar,	30 minims
Oil of Sassafras,	1 fl.ounce
Oil of Eucalyptus,	2 fl.drachms
Oil of Peppermint,	10 minims
Tincture of Aconite Root,	2 fl.drachms
Yellow Wax,	2 ounces av.
Petrolatum,	16 ounces av.

Melt, make in the same manner as the preceding.

Catarrh Snuff.

Catarrh snuff, which was once a popular remedy, has become a slow seller. The following formula will be sufficient:

Euphorbium, in very fine powder,	$\frac{1}{4}$ ounce
Bismuth Subnitrate,	$\frac{1}{4}$ ounce
Salicylic Acid,	$\frac{1}{4}$ ounce
Oil of Wintergreen,	30 minims
Scotch Snuff,	15 ounces

Mix them by rubbing the oil of wintergreen with a portion of the snuff, adding the euphorbium and salicylic acid, and then mixing with the remainder of the snuff.

CATHARTICS AND LAXATIVES.

A great variety of preparations designed to act as laxatives or cathartics are found among the proprietary medicines, most of them, however, under some other title. Many preparations not specially advertised as laxatives are intended to act in that capacity, and besides these, are proprietary medicines in great variety, consisting of cordials, elixirs, syrups, solutions, tinctures, mineral waters, effervescing salts, aperients, pills, powders, lozenges and teas, all of which seem to be required to move the public bowels. The following are specially representative of this class of preparations, but others, which act as cathartics or laxatives, will be found under other headings. See Elixirs, Tinctures, Syrups etc.

Cascara Cordial.**Cathartic or Laxative Cordial.**

The introduction of cascara preparations in palatable form opened a new field in the domain of laxatives. Cascara has proved a very reliable and efficient laxative, which by its tonic action relieves constipation better and more permanently than any other remedy. In the form of a cordial, combined with aromatics and deprived of its bitter taste, it has become very popular and there is now a large sale for this preparation, either as a proprietary or semi-proprietary. The following formula makes a preparation similar to one of the best known, and it will be found entirely satisfactory:

Cascara Sagrada Bark, in coarse powder,	1½ ounces av.
Berberis Aquifolium Root, in coarse powder,	5 ounces av.
Liquorice Root, in coarse powder,	1½ ounces av.
Coriander Seed, in fine powder,	2 ounces av.
Angelica Root, in fine powder,	¼ ounce av.
Ammonia Water,	1½ fl.ounces
Anise Oil,	7 minims
Orange Oil,	4 minims
Cassia Oil,	4 minims
Sugar,	3½ pounds
Diluted Alcohol,	3 pints
Water, sufficient to make	1 gallon

Macerate the cascara bark and the liquorice root for 12 hours with 2 pints of water, to which the ammonia water has been added, then heat to boiling, adding boiling water 2 pints, and continue the heat for half an hour; then strain, adding through the strainer enough boiling water to make 4 pints of the decoction. Moisten the berberis, coriander and angelica with 8 fl.ounces of diluted alcohol, and macerate for 12 hours, pack in a percolator, add the remainder of the diluted alcohol and percolate, adding water at last through the percolator until 3 pints are obtained. Dissolve the oils in half an ounce of alcohol and add to the tincture, then add the tincture to the decoction and mix them well together; filter and dissolve the sugar in the filtrate.

In making preparations of cascara it has been proven that only cascara bark at least 2 years old should be used, as it requires age to develop its true medicinal value. There are several varieties of inferior bark upon the market which are quite unsatisfactory in their results, care should therefore be taken to procure a good quality of cascara bark for making this preparation.

Castorol.

A Child's Laxative, "Castoria."

Castoria has been one of the most extensively advertised and most successful of the proprietary medicines. It is intended mainly as a laxative and a regulator for children.

The courts have decided that "castoria," although properly a trade mark, does not protect the manufacturers against those who desire to put up a preparation under another name, with similar composition; in fact, as they have patented the formula, and the term of the patent has expired, there is no reason why druggists may not put up castoria by that name, if it is not a colorable imitation of the original package.

The following formula makes a preparation similar in composition to the proprietary article, the formula for which was introduced by Dr. Samuel Pitcher, and has been found satisfactory in every way:

Senna Leaves,	16	ounces
Pumpkin Seed,	6	ounces
Anise Seed,	1	ounce
Wormseed,	3	ounces
Rochelle Salts,	4	ounces
Sodium Bicarbonate,	2	ounces
Sugar,	6	pounds
Essence of Wintergreen,	$\frac{1}{2}$	fl.ounce
Essence of Peppermint,	1	fl.drachm
Alcohol,	1	pint
Water, sufficient to make	1	gallon

Bruise the senna, pumpkin seeds, anise and worm seed and steep them in 6 pints of water, with gentle heat, for 3 hours; pour off the liquid and reserve; put 2 pints more water on the drugs and steep for 1 hour more, then pour off the liquid, press lightly, and add the liquid to the portion previously reserved, and evaporate it by gentle heat to 4 pints. When cool add the alcohol and essences, and dissolve the sugar, salt etc., in the liquid, by agitation, adding enough water to make 1 gallon.

California Fig Laxative.

The most popular proprietary laxative that has been put upon the market is "California Fig Syrup." The proprietors of this preparation claim the title as a trade mark. It is unnecessary, however, to get into any trouble on account of the name, and if the title is used as above and the package is not a colorable imitation, there will be no question as to the right of druggists to use it. The following makes a satisfactory preparation:

Fig Laxative.

Figs, chopped fine,	8	ounces
Dates, without seeds, chopped fine,	4	ounces
Buckthorn Bark, in coarse powder,	8	ounces
Senna Leaves, cut or bruised,	8	ounces
Cascara Bark, in coarse powder,	8	ounces
Sodium Bicarbonate,	1	ounce
Rochelle Salts,	4	ounces
Sugar,	6	pounds
Oil of Anise,	15	minims
Oil of Peppermint,	15	minims
Oil of Wintergreen,	10	minims
Alcohol,	20	fl.ounces
Water, sufficient to make	1	gallon

Mix the drugs, pour upon them 2 quarts of boiling water, steep for 6 hours, pour off the liquid and reserve; add to the drugs 3 pints of boiling water, steep as before, pour off and press the residue, adding

the liquid to the portion previously reserved. To the liquid add the alcohol in which the oils have been dissolved, shake and, after standing 24 hours, pour off carefully from the sediment that collects in the bottom and dissolve the sugar in the liquid by gentle heat or agitation, adding if necessary, sufficient water to make 1 gallon. The dose is a dessertspoonful to a tablespoonful for an adult. It is an excellent remedy for habitual constipation.

Cathartic Liver Pills.

Extract Nux Vomica,	10 grains
Podophyllum Resin,	10 grains
Capsicum, in fine powder,	20 grains
Purified Aloes,	100 grains
Extract Hyoscyamus,	30 grains

Mix and make 100 pills.

Each pill contains $\frac{1}{2}$ grain each extract nux vomica and podophyllum, $\frac{1}{2}$ grain capsicum, about $\frac{1}{3}$ grain extract of hyoscyamus, and 1 grain of purified aloes.

The dose as a laxative and liver pill is 1 before meals, from once to three times a day; as a cathartic, 2 to 4 pills.

This is an excellent tonic and liver pill, particularly valuable for habitual constipation, headache, inactive liver etc., and cannot fail to give satisfaction.

Little Giant Liver Pills.

Aloin,	10 grains
Podophyllum Resin,	20 grains
Capsicum,	10 grains
Extract of Nux Vomica,	20 grains
Extract of Hyoscyamus,	20 grains

Mix and make 100 pills.

These are generally sold under the title of Little Liver Pills, but are mostly used as a laxative or cathartic, the dose as a cathartic being 3 to 4 pills at night or morning.

Many other formulas for cathartic pills will be found under the subject heading "Pills."

Fruit Laxative Lozenge.

Under the name Tamar-Indien, Tropical Fruit Laxative, Confection-Laxative etc., laxative or cathartic lozenges have had a good sale. The following formula makes a good preparation of this sort. They are generally put up half a dozen in a tin box for 25 cents, or one dozen for 50 cents.

Tamarind pulp, thick,	2 ounces
Extract of Senna,	2 ounces
Aloin,	10 grains
Manna,	1 ounce
Podophyllum Resin,	10 grains

The tamarind pulp should be thick and the extract of senna of as firm consistence as can be obtained. The substances should then be warmed and well kneaded together, then rolled out and cut into oval lozenges of about 45 grains, covered with tin foil and wrapped in paraffin paper.

The dose, as a laxative, is 1 lozenge at night; as a light cathartic, 2 lozenges may be taken.

Fig pulp may be used in place of the tamarind pulp. A very fine lozenge may be made by using a portion of pistachio paste in the mixture. Grape sugar may be used in the place of manna, but is not so good.

Laxative Tea.

Buckthorn Bark, cut,	4	ounces
Dandelion Root, cut,	4	ounces
Senna Leaves, cut,	4	ounces
Liquorice Root,	1	ounce
Sweet Flag Root, cut,	$\frac{1}{2}$	ounce
Coriander Seed, bruised,	$\frac{1}{2}$	ounce
Anise Seed, bruised,	$\frac{1}{2}$	ounce

Mix thoroughly, and put up in packages of about 2 ounces, which will retail for 25 cents.

As a laxative, a package may be steeped in a pint of water, strained and mixed with half a pint of whiskey or gin and $\frac{1}{4}$ pound of sugar. Dose a wineglassful.

In the form of powder the compound powder of glycyrrhiza is a good preparation to put up as a general laxative.

CHOLERA REMEDIES.

The active demand for cholera cures is limited to the later summer months, yet there is considerable sale for preparations under this name all the year round, as they are used also for dysentery, diarrhœa etc. Many preparations which may be put up for this purpose have been noted already under other headings (see Mixtures, Tinctures etc.), but the following may be found useful, the first two being original, the others old and popular formulas. Other formulas for similar use will be found under Dysentery Remedies.

Cholera Remedy — Stimulating.

Capsicum,	4	ounces av.
Camphor,	4	ounces av.
Catechu,	4	ounces av.
Opium,	1	ounce av.
Oil of Cajeput,	1	fl.ounce
Oil of Peppermint,	1	fl.ounce
Oil of Cinnamon,	2	fl.drachms
Oil of Cloves,	2	fl.drachms

Alcohol,	7½ pints
Hot Water,	12 fl.ounces

Macerate the catechu and opium with the hot water, rubbing them in a mortar until reduced to a pulpy mass, dissolve the oils and camphor in the alcohol, add the capsicum and the solution of catechu and opium, allowing the mixture to macerate a week or longer, shaking every day, then filter.

Dose, as a preventative, 10 to 15 drops in a little water every morning. For cholera, cholera infantum, cholera morbus, cramp, colic or internal pain, from 15 drops to a teaspoonful in sweetened water every hour, or oftener if necessary, until relieved. It may also be applied over the pit of the stomach and bowels.

Cholera Remedy — Sedative.

Tincture of Opium,	3 fl.ounces
Chloral Hydrate,	1 ounce av.
Spirit (Essence) of Peppermint,	1 fl.ounce
Ether, (Sulphuric),	1 fl.ounce
Tincture of Catechu,	4 fl.ounces
Diluted Alcohol,	6 fl.ounces

Mix the liquids and dissolve the chloral hydrate in the mixture. Dose and directions, the same as the preceding.

Asiatic Tincture for Cholera.

Powdered Opium,	1 ounce av.
Camphor,	1 ounce av.
Oil of Cloves,	1 ounce av.
Powdered Capsicum,	1 ounce av.
Hoffmann's Anodyne,	1 pint

Macerate 2 weeks and filter. Dose 20 to 60 drops.

Australian Cholera Specific.

Sulphuric Acid,	320 grains
Nitric Acid,	192 grains
Sugar,	240 grains
Gum Arabic,	240 grains

Water, enough to make a pint.

Mix the acids with 12 ounces of water, add the sugar and gum, dissolve and add enough water to make a pint.

Dose a tablespoonful followed by a drink of water, and repeat in half an hour, or frequently, until the disease is checked. The remedy is claimed never to have failed to cure if taken in reasonable time.

New York "Sun" Cholera Mixture.

Tincture of Capsicum,	1 part
Tincture of Opium,	1 part

Tincture of Rhubarb,	1 part
Spirit of Peppermint,	1 part
Spirit of Camphor,	1 part

Mix. Dose 15 to 30 drops in a wineglass of water.

Russian Cholera Drops.

Oil of Peppermint,	75 minims
Tincture of Opium,	5 fl.drachms
Wine of Ipecac,	2 fl.ounces
Tincture of Valerian,	4 fl.ounces

Mix. Dose 10 to 20 minims.

Sparkman's Cholera Mixture.

Camphor,	1 drachm
Kino,	2 ounces
Catechu,	$\frac{1}{2}$ ounce
Powdered Cinnamon,	2 ounces
Powdered Cloves,	1 ounce
Powdered Capsicum,	2 ounces
Brandy, q. s.	

Moisten the powders with brandy, pack in a percolator, macerate 48 hours and percolate 18 fl.ounces. To this add:

Tincture of Opium,	$2\frac{1}{2}$ fl.ounces
Chloroform,	1 fl.ounce

Dose 60 drops.

Squibb's Cholera Mixture.

Chloroform,	3 parts
Tincture of Opium,	8 parts
Spirit of Camphor,	8 parts
Tincture of Capsicum,	8 parts
Alcohol,	13 parts

Mix. Dose 1 to 2 fl.drachms.

Thielmann's Cholera Drops.

Oil of Peppermint,	1 fl.ounce
Alcohol,	8 fl.ounces
Tincture of Opium and Saffron,	3 fl.ounces
Tincture of Ipecac,	8 fl.ounces
Tincture of Valerian,	$13\frac{1}{2}$ fl.ounces

Mix. Dose 1 to 2 fl.drachms.

CORN, BUNION AND CHILBLAIN REMEDIES.

The most popular remedies for corns have been those in which collodion has been used as a base, and which form an artificial skin when applied, and thus keep the medicinal agents in place. The same remedies also apply to bunions. Chilblains require other treatment, but are included under this heading.

Corn Killer.

This preparation is similar to a variety of preparations known as German Corn Cures, Corn Eradicators, and by many other names. Extract of Cannabis Indica is used in some, giving the preparation a greenish color.

Gun Cotton, (Pyroxylin),	200 grains
Ether, (Sulphuric),	12½ fl.ounces
Alcohol,	3½ fl.ounces
Salicylic Acid,	2 ounces av.
Zinc Chloride,	1 ounce av.

Mix the ether and alcohol and dissolve the gun cotton in the mixture (this will require a day or two), then add the salicylic acid and, when it has dissolved, add the zinc chloride. Keep tightly stopped and away from the light and fire.

This is applied once a day for three days in succession, the part is then bathed in warm water and the skin and adhering corn removed. It may also be applied to bunions.

Corn Salve — Caustic.

A number of corn salves have been popular proprietary preparations, but are not generally so effective as the foregoing:

Caustic Soda or Potassa,	4 ounces av.
Water,	4 fl.ounces
Starch, in fine powder,	1 ounce av.
Glycerin,	8 ounces av.

Dissolve the soda or potassa in the water by the aid of heat, mix the starch with the glycerin and heat, with constant stirring, until the starch is entirely gelatinized and the preparation is of a uniform consistence, then mix with it the warm solution of soda and put up while warm in small, wide-mouthed bottles or glass boxes.

To use, spread a little of the salve on the corn or bunion, taking care to cover only the part to be removed, cover with a piece of cloth and allow to remain from 2 to 4 hours, then soak the parts in warm water.

This is a caustic application and needs only to be applied once or twice. It is equally efficacious for warts.

Corn Salve — Magic.

Salicylic Acid,	2 drachms
Arsenic,	1 drachm
Petrolatum,	1 ounce

Mix them by rubbing well together to form a salve which may be applied on a piece of linen.

Corn Plaster.

The most familiar corn plasters are those made by spreading some adhesive plaster over thick felt and then cutting or punching out,

leaving a hole in the center which allows the corn to stick up, thus relieving the pressure upon it.

A good corn plaster to be spread upon leather or cloth, and thus applied to the corn, may be made with salicylic acid 1 part, Burgundy pitch 1 part, yellow wax 1 part; melted together and mixed.

Night Corn Remover.

Salicylic Acid,	1 ounce
Glycerite of Starch, (page 729),	2 ounces

Incorporate the salicylic acid with the glycerite of starch by kneading them thoroughly together in a mortar. This is to be spread thickly on thin leather or linen and applied at night.

Soft Corn Remover. The same formula as above. The mass may be made into a flat disc and inserted between the toes, covering the soft corn.

Chilblain Lotion.

Oil of Eucalyptus,	2 fl.ounces
Camphor,	2 ounces av.
Carbolic Acid,	1 ounce av.
Alcohol, sufficient to make	1 pint

Mix and dissolve. To be applied night and morning. It reduces the inflammation and is a sure cure for chilblains before they break.

Chilblain Ointment.

Oil of Eucalyptus,	1 fl.ounce
Camphor,	1 ounce av.
Yellow Wax,	2 ounces av.
Petrolatum,	12 ounces av.

Mix the wax and petrolatum and, having mixed the other ingredients and dissolved them, add to the melted substances while cooling and mix well. This is a soothing and curative ointment for chilblains and tender feet.

COUGH REMEDIES.

Of all proprietary preparations, cough remedies are the most numerous and have the greatest sale. Time was when Jayne's Expectorant and Ayer's Cherry Pectoral were about the only generally known cough remedies; but now a list of those more or less popular, would fill several pages; besides a great many retail druggists put up some proprietary cough remedy of their own. There is never any risk in putting up a cough remedy of your own; it will sell if it is good for anything, and those who buy it will return for more.

In the formulas which follow, representatives only of such as are most popular have been selected. They are known on the market by names similar to those given, but the formulas do not claim to

make exact duplicates of any manufacturer's proprietary medicines, only that they are as good as any. As a general cough remedy the first one of the series is recommended as giving good satisfaction. It is not like any other in the market, but makes a fine preparation.

Cough Remedy.

Tincture Opium, Camphorated,	8	fl.ounces
Fluidextract Ipecac,	1	fl.ounce
Fluidextract Squill,	1	fl.ounce
Tincture Tolu,	2	fl.ounces
Tincture Lobelia,	1	fl.ounce
Tincture Hyoscyamus,	2	fl.ounces
Powdered Extract of Liquorice,	$\frac{1}{2}$	ounce av.
Tartar Emetic,	50	grains
Ammonium Chloride,	2	ounces av.
Chloroform,	$\frac{1}{2}$	ounce av.
Magnesium Carbonate,	$\frac{1}{2}$	ounce av.
Sugar,	5	pounds
Water, sufficient to make	1	gallon

Rub the tincture of tolu with the magnesium carbonate in a mortar, mix the tinctures and fluidextracts with half a gallon of water, dissolve the extract of liquorice in the mixture, add it to the magnesia etc., in the mortar and filter through paper until clear. Dissolve the tartar emetic in 4 ounces of boiling water and add to the solution and the ammonium chloride to the filtrate and dissolve: put the sugar in a gallon bottle or jug, add the chloroform to the dry sugar and mix them thoroughly, then add the liquid previously prepared and enough water to make a gallon, and dissolve the sugar by agitation.

This is an excellent general cough remedy, the dose being $\frac{1}{4}$ to 1 teaspoonful.

Cough Remedy, without Sugar.

It is often desirable to have a cough remedy without sugar. The following will be found a very efficient preparation:

Morphine Sulphate,	6	grains
Cherry Laurel Oil,	5	minims
Ammonia Water,	1	fl.drachm
Spirit of Anise,	15	minims
Solution of Saccharin,	1	fl.drachm
Chloroform,	5	minims
Calcined Magnesia,	60	grains
Water,	16	fl.ounces

Dissolve the cherry laurel oil in the spirit of anise and rub with the magnesia in a mortar, gradually add the water and filter the mixture, add the remaining ingredients and shake thoroughly. Dose for an adult, a teaspoonful.

Baby Cough Syrup.

Spirit of Anise,	15 minims
Chloroform,	5 minims
Ammonium Carbonate,	30 grains
Water,	1 fl.ounce
Codeine,	2 grains
Syrup,	15 fl.ounces

Rub the ammonium carbonate with the water, add the spirit of anise and then the syrup. Dissolve the codeine in a little water and add; then add the chloroform and mix them well together. This is a mild cough syrup that may be given to babies and small children, $\frac{1}{4}$ to 1. teaspoonful doses.

Cough Balsam.

Tincture of Tolu,	$\frac{1}{2}$ fl.ounce
Tincture of Bloodroot,	$\frac{1}{2}$ fl.ounce
Tincture of Opium,	$\frac{1}{2}$ fl.ounce
Fluidextract of Conium,	$\frac{1}{2}$ fl.ounce
Fluidextract of Elecampane,	$\frac{1}{4}$ fl.ounce
Oil of Sassafras,	5 minims
Tartar Emetic,	8 grains
Boiling Water,	1 fl.ounce
New Orleans Molasses,	14 fl.ounces

Dissolve the tartar emetic in the boiling water and add it to the molasses, dissolve the oil of sassafras in the tincture of tolu, mix it with the other tinctures and fluidextracts, and add the molasses to the mixture, shaking them thoroughly together.

Cough Cordial.

Anise Seed,	$\frac{1}{2}$ ounce av.
Fennel Seed,	20 grains
Blood Root,	180 grains
Wild Cherry,	1 ounce av.
Liquorice Root,	$\frac{1}{2}$ ounce av.
Alcohol,	6 fl.ounces
Water, q. s., about	10 fl.ounces
Sugar,	6 ounces av.

Grind the drugs to a coarse powder, mix the alcohol with 8 ounces of water and, having moistened the drug with 4 ounces of the mixture, allow them to macerate in a covered vessel for 24 hours; then pack moderately in a percolator, pour upon them the remainder of the liquid and percolate, adding water through the percolator after the liquid has disappeared from the surface and continuing the percolation until 13 fl.ounces have passed. In this dissolve the sugar and, after standing a few days, filter.

Cough Syrup.

Syrup of Squill,	3	fl.ounces
Syrup of Tolu,	6	fl.ounces
Hydrocyanic Acid, diluted,	2	fl.drachms
Wine of Ipecac,	3	fl.ounces
Tincture of Opium, Camphorated,	3	fl.ounces
Tincture of Sanguinaria,	$\frac{1}{2}$	fl.ounce

Mix them. This is an excellent sedative cough cure.

Cough Honey.

Morphine Sulphate,	8	grains
Tartar Emetic,	8	grains
Ammonium Chloride,	256	grains
Boiling Water,	1	fl.ounce
Tincture of Opium, Camphorated,	1	fl.ounce
Tincture of Tolu,	$\frac{1}{2}$	fl.ounce
Sugar,	14	ounces av.
Water,	7	fl.ounces

Mix the tinctures with the sugar and agitate in a bottle, dissolve the morphine and tartar emetic in the boiling water, and the ammonium chloride in 6 ounces of cold water; mix the solutions and add them to the sugar in the bottle. Dissolve by agitation.

If a clear preparation is desired, the tolu may be rubbed with magnesium carbonate and water and filtered.

Cough Mixture.

The following, with various modifications and additions, is a very common and popular prescription for coughs etc.:

Syrup of Squill,	I	ounce
Syrup of Tolu,	I	ounce
Wine of Ipecac,	I	ounce
Tincture of Opium, Camphorated,	I	ounce

To this is frequently added:

Tincture of Bloodroot,	$\frac{1}{4}$	ounce
Syrup of Wild Cherry,	I	ounce
Hydrocyanic Acid, diluted,	$\frac{1}{8}$	ounce

and various other medicines.

Compound Syrup of Wild Cherry.

Wild Cherry, in coarse powder,	2	ounces av.
Ipecac, in fine powder,	$\frac{1}{2}$	ounce av.
Bloodroot, in fine powder,	$\frac{1}{2}$	ounce av.
Tincture of Opium,	$\frac{1}{2}$	fl.ounce
Water, q. s., or	12	fl.ounces
Sugar,	14	ounces av.
Chloroform,	1	fl.drachm

Mix the drugs, moisten them with 4 ounces of water and macerate for 12 hours, then pack moderately in a conical percolator and percolate with water until 9 fl.ounces are obtained; mix the chloroform with the sugar in a bottle and add the percolate and dissolve by agitation.

This may also be made by mixing fluidextracts of wild cherry 2 fl.ounces, ipecac and bloodroot, each, $\frac{1}{2}$ ounce, and tincture of opium $\frac{1}{2}$ ounce with 6 ounces of water and filtering; then mix the chloroform with the sugar, add the filtered liquid and dissolve.

Compound Syrup of Wild Cherry and Tar.

This cough remedy has enjoyed as great and lasting popularity as any proprietary remedy. The following formula can be depended upon as making a very satisfactory preparation:

Oil of Tar,	1 fl.ounce
Wild Cherry Bark, coarsely ground,	8 ounces av.
Tincture of Opium,	4 fl.ounces
Fluidextract of Ipecac,	4 fl.ounces
Sugar,	6 pounds
Alcohol,	1 pint
Hot Water and Water, to make	1 gallon

To the wild cherry bark add a pint of hot water and set aside in a warm place for 12 hours in order that the hydrocyanic acid may be developed. Add to this the oil of tar, mixing them intimately. Then pack rather loosely in a percolator or glass funnel, and percolate with 4 pints of hot water, reserving the first 2 pints that are received, and passing the remainder of the percolate two or three times through in order to exhaust the strength. To the infusion thus prepared add the fluidextract, tincture and alcohol, and after standing, filter. In the filtrate dissolve the sugar by agitation, adding enough water through the filter, if necessary, to produce a gallon of syrup.

Chloroform 2 drachms, added to this syrup greatly improves it. It should be mixed with the sugar before it is dissolved.

Consumption Remedy.

Tincture of Tolu,	$\frac{1}{2}$ fl.ounce
Fluidextract of Lobelia,	$\frac{1}{4}$ fl.ounce
Fluidextract of Indian Cannabis,	$\frac{1}{4}$ fl.ounce
Morphine Sulphate,	8 grains
Tartar Emetic,	8 grains
Chloroform,	1 fl.drachm
Essence of Peppermint,	15 drops
Boiling Water,	1 fl.ounce
Sugar,	14 ounces av.
Water,	8 fl.ounces

Mix the fluidextracts, tincture of tolu, chloroform and essence with the sugar in a bottle, and agitate them thoroughly; dissolve the morphine and tartar emetic in the boiling water and add the solution with the 8 ounces of water to the sugar in the bottle; keep tightly stopped and agitate until the sugar is dissolved.

This makes a preparation similar to Piso's Remedy.

As thus prepared this preparation is not clear, but translucent. A clear syrup may be made by rubbing the tincture of tolu, fluidextract of lobelia, fluidextract of Indian cannabis and essence of peppermint first with $\frac{1}{2}$ ounce of magnesium carbonate, then adding in the mortar 8 ounces of water, rubbing them well together, filtering, adding the tartar emetic dissolved in the boiling water, mixing the chloroform with the sugar, and then dissolving the sugar and morphine in the liquid.

Remedy for Consumption.

Oil of Peppermint,	15 minims
Oil of Wintergreen,	5 minims
Oil of Tar,	60 minims
Tincture of Tolu,	$\frac{1}{2}$ fl.ounce
Tincture of Sanguinaria,	$\frac{1}{2}$ fl.ounce
Fluidextract of Ipecac,	$\frac{1}{4}$ fl.ounce
Hydrocyanic Acid,	$\frac{1}{4}$ fl.ounce
Chloroform,	40 grains
Molasses, (Porto Rico),	1 pint

Mix and agitate thoroughly. This is similar to a Western preparation.

Expectorant.

Fluidextract of Hyoscyamus,	$\frac{1}{2}$ fl.ounce
Fluidextract of Lobelia,	$\frac{1}{4}$ fl.ounce
Fluidextract of Skunk Cabbage,	$\frac{1}{2}$ fl.ounce
Potassium Cyanide,	8 grains
Water,	$\frac{1}{2}$ fl.ounce
New Orleans Molasses,	14 fl.ounces

Dissolve the potassium cyanide in the water and mix with the fluidextracts, filter, then add the syrup and mix thoroughly.

Honey of Hoarhound and Tar.

Syrup Wild Cherry, Hoarhound and Tar.

Powdered Opium,	60 grains
Hoarhound,	$\frac{1}{2}$ ounce av.
Wild Cherry,	2 ounces av.
Ipecac,	$\frac{1}{2}$ ounce av.
Pine Tar,	$\frac{1}{2}$ ounce av.
Water, q. s., or	12 fl.ounces
Sugar,	14 ounces av.

Grind the drugs to a coarse powder and mix them thoroughly with the tar, pour upon them 4 ounces of water and macerate for 24 hours, then pack moderately in a conical percolator and percolate with water until 9 ounces are obtained; dissolve in this the sugar by agitation.

Hale's Honey of Hoarhound and Tar. Oil of tar 2 fl.drachms, fluid-extract of hoarhound 4 fl.drachms, oil of anise 5 drops, Jamaica rum 8 fl.ounces, honey enough to make 16 fl.ounces.

Lung Balsam.

Nitric Acid,	120 minims
Fluidextract of Lobelia,	1 fl.ounce
Tincture of Opium,	6 fl.ounces
Extract of Conium,	4 fl.ounces
Extract of Liquorice,	3 ounces av.
Oil of Sassafras,	10 minims
Alcohol,	1 pint
Water,	2 pints
Boiling Water,	8 fl.ounces
Porto Rico Molasses,	4 pints

The dose is a teaspoonful.

Mix the fluidextracts, tincture of opium, oil, acid and extract of liquorice with the water and alcohol; dissolve the tartar emetic with the boiling water and add to the mixture; filter and add the molasses to the filtrate.

Sedative Cough Remedy.

(Without Opium).

This formula is given to furnish a good remedy without opium (which is often objectionable). This preparation is especially valuable in irritating and obstinate coughs, and is a pleasant sedative and expectorant cough remedy.

Potassium Bromide,	1 ounce av.
Tincture of Sanguinaria, (Bloodroot),	3 fl.drachms
Tincture of Hyoscyamus,	2 fl.ounces
Ether,	$\frac{1}{2}$ fl.ounce
Syrup of Ipecac,	2 fl.ounces
Syrup of Tolu,	7 fl.ounces
Alcohol,	1 fl.ounce
Water,	3 fl.ounces

Dissolve the potassium bromide in the water; mix the solution with the tinctures and filter; add the syrups; mix the alcohol with the ether and add to the mixture.

Dose the same as other cough remedies, but it may be given freely without injury.

Terebene Cough Mixture.

Terebene, purified,	1 fl.ounce
Acacia, in powder,	$\frac{1}{2}$ ounce av.
Sugar,	3 ounces av.
Yolk of Egg,	two
Anise Water,	2 fl.ounces
Camphor Water,	$\frac{1}{2}$ fl.ounce
Distilled Water, to make	8 fl.ounces

Rub the acacia and sugar with the terebene in a mortar, beat the yolk of egg with the medicated waters and make an emulsion by rubbing with the contents of the mortar, then add water enough to make 8 fl.ounces. By using lemon juice instead of distilled water, a more palatable preparation may be made.

The dose is a teaspoonful.

Terpin Cough Compound.

Terpin Hydrate,	128 grains
Codeine,	16 grains
Alcohol,	2 ounces
Solution of Saccharin,	1 fl.drachm
Water,	2 ounces
Syrup of Tolu,	12 fl.ounces

Mix the terpin hydrate with the alcohol, dissolve the codeine in the water. Add the syrup of tolu gradually and with frequent shaking to the terpin hydrate solution, and when all is added, mix with the solution of codeine and saccharin. Dose a fl.drachm for an adult.

Terpin and Heroin Cough Compound. This may be made the same as the above, only using 8 grains of heroin instead of codeine.

White Pine Expectorant.

This has been a very popular cough syrup. The formula, first published in Fenner's Complete Formulary, was to make a tincture of white pine by taking

White pine Turpentine, (Gum Thus),	2 ounces av.
Alcohol,	14 fl.ounces

Cut the gum in small pieces and dissolve it in the alcohol by maceration in a warm place.

Compound Syrup White Pine.

Morphine Sulphate,	8 grains
Fluidextract of Ipecac,	$\frac{1}{2}$ fl.ounce
Chloroform,	1 fl.drachm
Tincture of White Pine, (as above),	2 fl.ounces
Magnesium Carbonate,	$\frac{1}{2}$ fl.ounce
Sugar,	18 ounces av.
Water,	8 fl.ounces

The tincture of white pine is to be rubbed with the magnesium carbonate in a mortar and the water added, and filtered; the fluidextract is then to be added and filtered again if necessary. The chloroform is to be mixed in a wide-mouth bottle with the sugar and the filtered liquid and morphine added, dissolving the sugar by agitation. This formula is still used by many, and is therefore retained in this revision.

Spruce Gum Expectorant may be made with a tincture of spruce gum made in the same maner as the tincture of white pine, and the other ingredients the same as above.

Another formula which makes a preparation corresponding with that of some manufacturers is as follows:

Formula for White Pine Expectorant.

White Pine Bark,	5¼ ounces
Balm of Gilead Buds,	4¼ ounces
Spikenard Root,	4¼ ounces
Wild Cherry Bark,	4 ounces
Blood Root,	1 ounce
Ipecac,	1 ounce

Alcohol, Water, each, a sufficient quantity.

Make an alcoholic tincture of balm of Gilead buds and blood root, by macerating them with alcohol for 24 hours and then slowly percolating with sufficient alcohol to make 1 pint of the tincture.

Mix the white pine bark, spikenard root, wild cherry bark and ipecac, pour upon them 2 pints of dilute alcohol, macerate for 24 hours, transfer to a percolator and percolate slowly with diluted alcohol until 3 pints of tincture are obtained.

Now rub the tincture of balm of Gilead buds etc. with 1 ounce of magnesium carbonate, and add to it the tincture prepared from the white pine bark etc., and filter through paper until clear, adding water through the filter to make in all 5 pints of the liquid when filtered clear. In this dissolve

Morphine Acetate,	35 grains
Chloroform,	¾ fl.ounce
Ammonium Chloride,	1 ounce
Sugar,	5 pounds

First dissolve the salts in the liquid, then the sugar by agitation and strain or let stand and decant to make 1 gallon of the syrup.

The addition of ¼ ounce tartar emetic to this preparation is beneficial.

Pectoral Tea or Hamburg Tea. Brust-Thee.

Althæa Root, cut,	4 ounces
Liquorice Root, cut,	1 ounce
Mullein Leaves, cut,	4 ounces
Senna Leaves, cut,	1 ounce

American Saffron,	$\frac{1}{4}$ ounce
Malva Flowers, cut,	3 ounces
Blue Flowers, (Asters or Bachelor Button),	$\frac{1}{4}$ ounce
Fennel Seed, bruised,	$\frac{1}{2}$ ounce
Anise Seed, bruised,	$\frac{1}{2}$ ounce
Granulated Sugar,	$\frac{1}{2}$ ounce

Mix them thoroughly and put up in packages of about 2 ounces.

Cough Drops or Candy.

There are in the market a great variety of cough drops which are mainly sold by the ounce and are not put up in the general style of proprietary remedies. They are usually made by confectioners and moulded in various shapes, and colored either black, red or brown. The most popular black cough drops were introduced by Smith Bros. of Poughkeepsie, N. Y., and are well known everywhere as "S. B." cough drops. A similar preparation may be made by adding to 1 pound of rock candy and 1 pound of sugar, mixed and boiled to the proper consistency for making drops, 2 ounces tincture of opium, 20 grains tartar emetic, $\frac{1}{4}$ ounce oil of anise, $\frac{1}{4}$ ounce oil of wintergreen, and coloring black with negrosine in solution.

Cherry cough drops are made by adding to 3 parts of rock candy and 1 part of sugar, mixed and boiled to the proper consistence, a very little morphine, tartar emetic, capsicum, and flavoring with bitter almond and coloring red.

Hoarhound Cough Drops may be made by adding a small quantity of fluidextract of hoarhound to the same rock candy and sugar base, and coloring slightly with caramel.

Cough Lozenges or Troches.

Many kinds of cough troches or lozenges have been popular as proprietary medicines. Brown's Bronchial Troches have been as well received as any, but now the compound troches, tablets, or lozenges for colds, sold in bulk, are more generally used.

A good bronchial troche, similar to the most popular ones, may be made as follows:

Extract of Liquorice, in powder,	1 pound
Cubebs, in fine powder,	6 ounces
Sugar, in fine powder,	1 $\frac{1}{2}$ pounds
Acacia, in fine powder,	4 ounces
Extract of Conium, powdered,	1 ounce
Tartar Emetic, in powder,	1 drachm

Mix them well together and, with mucilage or water, make into a mass, which is to be rolled out and cut into lozenges of about 10 grains. The mass may be flavored with oil of anise, oil of fennel, or any other flavoring that may be desired by adding the oil to a portion of the powder, and mixing, then working the portion into the re-

mainder of the powder before making the mass.

By adding other substances, as morphine, opium, ipecac etc., other varieties may be made. Similar ingredients may be made into compressed lozenges, if desired.

DIARRHŒA AND DYSENTERY REMEDIES.

The milder forms of remedies which are used for summer complaints and looseness of the bowels are known in proprietary medicine as Diarrhœa or Dysentery Remedies. Carminatives, which have already been mentioned, are similar. The stronger preparations are mostly known as cholera cures, mixtures, drops, or by some other title. See Cholera Cures.

The following are the most popular:

Blackberry Cordial.

Blackberry Juice,	4	pints
Catechu,	4	ounces av.
Cinnamon,	1	ounce av.
Nutmeg,	1	ounce av.
Coriander Seed,	1	ounce av.
Opium, in powder,	$\frac{1}{4}$	ounce av.
Sugar,	2	pounds
Alcohol,	$2\frac{1}{2}$	pints
Water, sufficient to make	1	gallon

Grind the drugs to a coarse powder and, having mixed the blackberry juice with the alcohol, macerate them for a week or 10 days in a warm place, then filter, add the sugar, dissolve by agitation and, having passed enough water through the filter, add it to the mixture to make 1 gallon of the finished product.

Instead of the blackberry juice, fluidextract of blackberry 4 ounces, with alcohol 4 ounces, sugar 4 ounces, and water enough to make the 4 pints may be used.

Dose from a teaspoonful to a dessertspoonful every hour or two until diarrhœa is checked.

This makes a finely flavored, pleasant and effective cordial for summer complaints, and will give complete satisfaction. It may be made from the juice freshly expressed from the berries, or from well preserved blackberry juice put up by reliable houses.

The following formula, although not quite so nicely flavored, is just as efficient and more convenient to make at all seasons of the year.

Blackberry Cordial.

Made from the Root.

Blackberry Root,	24	ounces av.
Nutmeg,	1	ounce av.
Cinnamon,	1	ounce av.

Coriander Seed,	1 ounce av.
Opium, in powder,	$\frac{1}{4}$ ounce av.
Sugar,	12 ounces av.
Alcohol,	$2\frac{1}{2}$ pints
Water sufficient to make	1 gallon

Grind the drugs to a moderately fine powder and having mixed the alcohol with 5 pints of water, moisten them with 2 pints of the mixture and macerate for 24 hours in a covered vessel, then transfer to the water-bath percolator, pack moderately, pour upon them the remainder of the menstruum, heat moderately for 1 hour, then turn off the heat and begin to percolate, adding water to the drugs after the liquid has disappeared from the top and continuing the percolation until $7\frac{1}{2}$ pints have been obtained. Lastly, dissolve the sugar in the percolate and filter.

Many other remedies for diarrhœa, dysentery and summer complaints will be found under other headings.

Diarrhœa Tablets.

Catechu, in powder,	200 grains
Kino, in powder,	100 grains
Opium, in powder,	25 grains
Sugar, in powder,	600 grains
Gum Arabic, in powder,	175 grains
Oil of Cinnamon,	20 drops

Mucilage of acacia, to make a mass which is to be made into 100 lozenges. Dose, 1 to 4.

DYSPEPSIA REMEDIES.

Among the general remedies for dyspepsia may be included all the tonic, stomach, iron and blood bitters, the alterative tonics and stimulants; but besides these are a large class of remedies particularly designed for dyspepsia, which have a large sale. Dyspepsia is the chief cause of indigestion of amylaceous and nitrogenous food, and it is rational to supply to the stomach the lacking ferments or solvents of these foods, that it may perform its proper functions. Diastase is the proper solvent for amylaceous food and pepsin for nitrogenous. In the animal economy diastase is a constituent of saliva, and in the vegetable it is found in greatest abundance in malted grain, being now most employed in medicine in the form of malt extract. Pepsin is the digestive ferment of the stomach, and is abundantly obtained from the stomachs of various animals. Now, while it would seem reasonable to supply to a dyspeptic stomach these elements, the absence of which causes indigestion, yet there are few dyspepsia cures on the market that do so, and, as we must "follow the fashion" and make formulas for remedies like some that are popular, we give a little variety.

Dyspepsia Remedy.

A proprietary remedy known as "August Flower," similar to the following, has had a large sale in this country.

Rhubarb,	6	ounces av.
Golden Seal,	1½	ounces av.
Cape Aloes,	¼	ounce av.
Peppermint herb, freshly dried,	2	ounces av.
Capsicum,	30	grains
Potassium Carbonate, (Sal Tartar),	2	ounces av.
Spirit (Essence) of Peppermint,	3	fl.drachms
Alcohol,	24	fl.ounces
Porto Rico Molasses,	2	pints
Water, sufficient to make	1	gallon

Reduce the drugs to a coarse powder and, having mixed the alcohol with 3 pints of water, dissolve the potassium carbonate in the mixture, moisten the powder with 12 ounces of the liquid and macerate in a warm place for 24 hours; transfer to a percolator, pack very moderately, pour upon it the remainder of the liquid and percolate, adding water to the drugs after the liquid has disappeared from the surface, and continuing the percolation until 6 pints have passed; to this add the essence of peppermint and molasses, and, after standing a few days, strain or decant.

This may also be made advantageously by water-bath percolation. The dose is a teaspoonful to a tablespoonful after meals.

Dyspepsia Tonic.

Tincture of Gentian Compound,	4	fl.ounces
Tincture of Rhubarb,	4	fl.ounces
Tincture of Ginger,	1	fl.ounce
Essence of Peppermint,	½	fl.ounce
Sodium Bicarbonate,	¾	ounce av.
Water, sufficient to make	1	pint

Mix the tinctures etc., dissolve the sodium bicarbonate in the water, mix the solutions and, after standing a day or so, filter.

This is an excellent general remedy for atonic dyspepsia with acid stomach, flatulence etc.

Dose a teaspoonful to a dessertspoonful after meals.

Digestive Dyspepsia Remedy.

Malt Extract,	6	fl.ounces
Pepsin, Saccharated,	240	grains
Tincture of Ginger,	1	fl.ounce
Fluidextract of Golden Seal,	1	fl.ounce
Essence of Peppermint,	½	fl.ounce

Fluidextract of Senna,	1	fl.ounce
Whisky,	4	fl.ounces
Water, enough to make	1	pint

Mix them. "Shake before taking."

Dose a teaspoonful or more before meals.

This is not a nice-looking mixture, and would hardly be a popular remedy for the market. It is also too expensive for general sale, but it is a very effective digestive and dyspepsia remedy, and may be found useful by some of our readers.

Dyspepsia Remedy.

A very good dyspepsia lozenge or tablet may be made with

Rhubarb, in fine powder,	500 grains
Bismuth Subnitrate,	500 grains
Sodium Bicarbonate,	300 grains
Ginger, in fine powder,	100 grains
Oil of Peppermint,	50 minims
Acacia, in fine powder,	300 grains
Sugar, in fine powder,	300 grains

Make into a mass with mucilage and divide into 100 tablets or lozenges. To make a white tablet omit the rhubarb.

Dyspepsia Tablets.

Saccharated Pepsin,	1000 grains
Saccharated Pancreatin,	1000 grains
Ginger, in fine powder,	50 grains
Oil of Pimento,	50 minims
Acacia, in powder,	300 grains

Make into a mass with water or mucilage and divide into 100 tablets.

Peptonic tablets may be made to contain in each, pure pepsin 1 grain, pure pancreatin 1 grain, with sugar and gum to make a 5 grain compressed tablet.

Soda-mint tablets are made 5 grains of sodium bicarbonate and ½ minim oil of peppermint in each.

EARACHE REMEDIES.

A few formulas for earache remedies will not be found amiss among the Standard Remedies. They may be made usually as wanted.

Earache Oil.

Olive Oil,	2 fl.drachms
Chloroform,	10 minims
Oil of Cajuput,	15 minims
Camphor,	10 grains

Mix and dissolve. Warm when dropped into the ear,

Earache Cure.

Morphine Sulphate,	1 grain
Boric Acid,	5 grains
Glycerin,	3 fl.drachms
Water,	1 fl.drachm

Dissolve, warm and drop in the ear.

EFFERVESCENT SALTS.

The use of effervescent salts has considerably increased during the past few years, especially at the soda fountain. The U. S. and Br. P. have several formulas which will be found in Part II. of this work. Besides these, quite a number are popular as proprietary remedies. Formulas for some of them follow, and others can be made on the same general principle.

General Directions for Preparing Effervescent Salts.

All the substances must be thoroughly dried and reduced to a fine powder separately. They are then to be mixed intimately, and if desired in granular form, moistened sufficiently with alcohol to make a soft mass that will cohere closely. This is to be rubbed through a No. 6 tinned-iron sieve and dried with only slight heat. When thoroughly dry it is to be put into dry bottles and tightly corked.

Effervescent Brom-Acetanilide Caffeine.

Potassium Bromide,	200 parts
Caffeine,	20 parts
Acetanilide,	60 parts
Sodium Bicarbonate,	600 parts
Tartaric Acid,	540 parts
Sugar,	440 parts

Prepare according to general directions.

A large, heaping teaspoonful of this contains about 10 grains of potassium bromide, 1 grain of caffeine, and 3 grains of acetanilide. This makes a fine combination for headache and nervous affections. The dose is from a level to a heaping teaspoonful (or more) thrown in a third to half a glass of water, to be drunk during effervescence.

Effervescent Bromo-Caffeine.

Potassium Bromide,	200 parts
Caffeine,	20 parts
Sodium Bicarbonate,	600 parts
Tartaric Acid,	540 parts
Sugar,	440 parts

Prepare according to general directions.

A large, heaping teaspoonful contains about 10 grains of potassium bromide and 1 grain of caffeine. The dose is a level to heaping tea-

spoonful (or more) in a third to half a glass of water, to be drunk during effervescence for headache, nervousness etc.

Effervescent Bromopyrine.

Caffeine,	20 parts
Antipyrine,	60 parts
Sodium Bromide,	300 parts
Sodium Bicarbonate,	600 parts
Tartaric Acid,	540 parts
Sugar,	440 parts

Prepare according to general directions.

Effervescent Bromo-Seltzer.

Potassium Bromide,	100 parts
Sodium Chloride, (fine dairy salt),	300 parts
Sodium Phosphate,	100 parts
Calcium Chloride,	25 parts
Sodium Sulphate,	50 parts
Calcium Phosphate,	100 parts
Sodium Bicarbonate,	600 parts
Tartaric Acid,	540 parts

All the substances are to be finely powdered separately, and mixed intimately. This salt is usually furnished in the form of a coarse powder as is directed in the preceding formulas. It is extensively used at the soda fountain and as a morning bracer. Dose a heaping teaspoonful in half a glass of water.

Effervescent Caffeine Hydrobromide. B. P. C., 1901.

Sodium Bicarbonate, in powder,	46 ounces
Tartaric Acid, in powder,	24 ounces
Citric Acid, in powder,	18 ounces
Refined Sugar, in powder,	18 ounces
Caffeine Hydrobromide, in powder,	4 ounces

Mix the sodium bicarbonate and refined sugar, and incorporate with the other ingredients, previously mixed. Place in a shallow enamelled pan and apply heat sufficient to cause the mixture to assume a condition suitable for granulation, and then separate it into granules of a convenient size by means of a suitable sieve. Dry the granules at a temperature not exceeding 120°F. The product should weigh about 100 ounces. Dose 60 to 120 grains.

Effervescent Citrated Caffeine. U. S.

Caffeine,	10 parts
Citric Acid,	10 parts
Sodium Bicarbonate,	320 parts
Tartaric Acid,	300 parts
Sugar, in very fine powder,	350 parts
Alcohol, a sufficient quantity.	

Triturate the solid ingredients separately, well-dried, to a fine uniform powder. Mix this with the alcohol to a soft paste and rub it through a No. 6 tinned-iron sieve or enamelled colander. Then dry it and reduce it to a coarse, granular powder. Keep the product in well-stoppered bottles. See page 481, Part II.

Effervescent Carlsbad Salt.

Potassium Sulphate,	6 parts
Sodium Chloride, (fine dairy salt),	60 parts
Sodium Bicarbonate,	700 parts
Sodium Sulphate, dried,	120 parts
Tartaric Acid,	535 parts
Sugar,	275 parts

Prepare according to general directions.

The dose is a heaping teaspoonful to a dessertspoonful in water.

Effervescent "Crab Orchard" Salt.

This is intended for making an artificial congress water, a heaping teaspoonful mixed with three-fourths of a glass of water.

Potassium Bicarbonate,	60 parts
Sodium Carbonate,	60 parts
Potassium Bitartrate,	300 parts
Tartaric Acid,	300 parts
Sodium Bicarbonate,	300 parts
Sugar,	400 parts

Prepare according to general directions.

This is much used at the soda fountain, and as a laxative.

Effervescent Kissingen Salts.

Ammonium Chloride,	20 parts
Sodium Chloride, (fine dairy salt),	600 parts
Magnesium Sulphate, (dried),	65 parts
Sodium Bicarbonate,	700 parts
Tartaric Acid,	520 parts

Prepare according to general directions.

This is much used at the soda fountain and to make artificial kissingen water, a heaping teaspoonful in a glass of soda water.

Effervescent Phenacetin with Caffeine. B. P. C., 1901.

Sodium Bicarbonate, in powder,	46 ounces
Citric Acid, in powder,	16 ounces
Tartaric Acid, in powder,	24 ounces
Refined Sugar, in powder,	16½ ounces
Phenacetin, in powder,	5 ounces
Caffeine Citrate, in powder,	2½ ounces

Prepare like Effer. Caffeine Hydrobromide. Dose 60 to 120 grains.

Effervescent Powder of Artificial Carlsbad Salt. B. P. C., 1901.

Exsiccated Sodium Sulphate,	11 ounces
Potassium Sulphate, in powder,	$\frac{1}{2}$ ounce
Sodium Chloride, in powder,	$4\frac{1}{2}$ ounces
Sodium Bicarbonate, in powder,	54 ounces
Tartaric Acid, in powder,	40 ounces
Gluside,	28 grains

Dry the ingredients separately, reduce to a fine powder and mix by trituration until quite uniform. Dose 60 to 120 grains.

Effervescing "Vichy" Salt.

Potassium Carbonate, (Sal Tartar),	15 parts
Sodium Phosphate,	60 parts
Magnesium Sulphate, (dried),	30 parts
Sodium Chloride, (salt),	60 parts
Sodium Bicarbonate,	900 parts
Tartaric Acid,	600 parts
Sugar,	250 parts

Prepare according to general directions.

This is much used at the soda fountain for making artificial vichy water, a large teaspoonful in a glass of soda water.

The foregoing formulas represent but few of the many effervescent salts that may be made in the same general way. They are much more readily made than many of the galenicals prepared by druggists, and have the advantage, when made by them, of being fresh, while many bought in the market are old and have lost their effervescing qualities.

ELIXIRS, ESSENCES AND EXTRACTS.

Quite a variety of proprietary preparations, under the name Elixirs, Essences and Extracts, are found on the market, but most of them are included in this work under other headings. Of the first, the general elixirs of calisaya, calisaya and iron, and their combinations; gentian and tincture iron chloride, elixirs of pepsin, elixirs of lactopeptin, and combinations, have been very popular as pseudo-proprietary medicines. Many other proprietary medicines are also known as elixirs, as Blood Elixir, Tonic Elixir, Down's Elixir for Coughs, McMunn's Elixir of Opium etc.

Of the proprietary remedies known as Essences, Essence of Ginger and Essence of Peppermint are the only ones which have any popular sale, and the former is more frequently called for as Extract of Ginger than as it is usually labeled. Of these extracts sold as proprietary, most of them are included under other headings, but a few are mentioned here for want of better classification.

Essence or Extract of Jamaica Ginger.

This preparation, more than any other, has been a popular favorite for mild forms of diarrhœa and summer complaint. It is also much used as a quick stimulant for colds, cramp, colic etc., and for dyspepsia. It is a popular domestic remedy and has a ready sale at all drug stores. The formula is as follows:

Jamaica Ginger Root, unbleached, in moderately fine powder,	2 pounds
African Ginger, ground fine,	1 pound
Alcohol, sufficient to make	1 gallon

Moisten the ginger, after being well-mixed, with 2 pints of alcohol, and pack firmly in the water-bath percolator, pour upon it 2 pints of alcohol and set in a warm place for 2 days, then heat moderately and, after 1 hour begin to percolate, adding alcohol to the drug and continuing the heat and percolation until 1 gallon is obtained. The alcohol remaining in the drug may be recovered by distillation.

The process of water-bath percolation is particularly valuable in making this preparation; no extract can be made by the cold process which equals it in flavor and strength. Consequently many manufacturers have been in the habit of adding capsicum, which is very objectionable in such a preparation. Mixing the two kinds of ginger is an improvement, as the Jamaica gives it the delicate flavor and the African adds to its strength and color.

Aromatic Extract of Jamaica Ginger.

As some of the essences of ginger on the market contain aromatics combined with ginger, this formula is given:

Jamaica Ginger, unbleached, in powder,	2 pounds
African Ginger, ground fine,	1 pound
Calamus, in powder,	1 ounce av.
Canada Snake Root, in powder,	1 ounce av.
Cinnamon and Mace, each,	1 drachm
Oil of Lemon, fresh,	2 fl.drachms
Alcohol, sufficient to make	1 gallon

Make an extract of the drugs by percolation the same as directed in the preceding formula, and add the oil of lemon.

This is used for the same purposes and given in the same quantities as the preceding.

Extract Pinus Canadensis.

This is a fluidextract prepared from the inner bark of hemlock trees, by extracting with water and evaporating the liquor until it is reduced to a thick extract, which may be preserved by the addition of 3 fl.ounces of glycerin in a pint.

A "white" or colorless extract is made from this by mixing with

freshly precipitated oxide of iron and treating as directed for detannating.

These extracts are used for washes, injections etc., and given internally for chronic diarrhoea and other similar diseases.

Extract of Shaker's Roots.

Sarsaparilla Root,	4 ounces
Leptandra Root,	2 ounces
Mandrake Root,	1 ounce
Valerian Root,	2 ounces
Calamus Root,	1 ounce
Hydrangea Root,	4 ounces
Diluted Alcohol, sufficient to make	1 pint

Make a pint of extract by water-bath percolation.

This is a general alterative, given in small doses, for almost everything.

Mother Seigle Curative Syrup.

The manufacturers of Shaker Extract of Roots publish the following as the formula from which it is prepared:

Extracts of Blue Flag Root, Culver's Root,	
Stillingia, Poke Root, Butternut Bark,	
Dandelion Root, each,	6¼ pounds
Extract of Prince's Pine,	5 pounds
Extract of Mandrake,	4 pounds
Extract of Gentian, Extract of Colocynth,	
of each,	2 pounds
Aloes,	9 pounds
Extract of Black Cohosh,	1 pound
Capsicum, in powder,	1 pound
Sassafras Bark,	10 pounds
Borax,	10 pounds
Hydrochloric Acid,	12 pounds
Sugar House Syrup,	30 gallons
Water, enough to make	90 gallons

Other extracts, which are put up as proprietary, are mostly included under other headings. The buchu extracts will be found under Kidney and Liver Cures; the malt extracts and combinations under malt preparations; witch hazel extracts under distilled extracts, the sarsaparilla extracts under various headings etc.

EYE WATERS.

Although the sale of proprietary eye waters is small as compared with other remedies, it is steady, and the preparations pay a large margin of profit and are easily prepared; therefore druggists can make it profitable to put them up. They are generally put up in 1-ounce round

bottles and are best applied with an ordinary medicine dropper which may, with advantage, be supplied with each bottle.

The following formulas are representative of the best preparations of this kind:

Standard Eye Water.

Zinc Sulphate,	20 grains
Morphine Sulphate,	16 grains
Glycerin,	2 fl.ounces
Rose Water,	14 fl.ounces
Mix and dissolve.	

Eye Water.

Fluid Hydrastis,	2 fl.drachms
Zinc Sulphate,	16 grains
Morphine Sulphate,	16 grains
Borax,	30 grains
Glycerin,	14 fl.ounces
Mix and dissolve.	

Eye Water.

Solution Subacetate of Lead,	30 minims
Glycerin,	2 fl.ounces
Distilled Water,	14 fl.ounces
Mix.	

Eye Water.

Alum, in powder,	10 grains
Boric Acid,	10 grains
Acetanilide,	10 grains
Glycerin,	2 fl.ounces
Distilled Water,	14 fl.ounces

Dissolve the salts in water, add the glycerin and, after standing, filter.

Any of the foregoing formulæ will make good general eye waters, similar to those which are sold as proprietary remedies. They are usually put up in 1-ounce bottles and sold for 25 cents.

EYE SALVES.

The demand for eye salves, like eye waters, is steady, but not large; yet they are so easily made and so profitable that druggists should put them up for their trade. The following formulæ make reliable preparations. It is necessary to have all the ingredients in very fine powder, and have them thoroughly mixed. Some manufacturers are now putting eye salves up in tubes instead of boxes, being more sanitary.

Standard Eye Salve.

Zinc Oxide,	✓ 1 ounce
Morphine Sulphate,	30 grains
White Petrolatum Ointment,	9 ounces

Rub the morphine intimately with the zinc to an impalpable powder and gradually incorporate the petrolatum with the mixture. The Hub-buck's English Oxide of Zinc is the best for this purpose.

Astringent Eye Salve.

Liquor of Lead Subacetate,	2 fl.drachms
Opium, in fine powder,	30 grains
Tannin, in fine powder,	20 grains
White Petrolatum Ointment,	8 ounces

Mix the Goulard's Extract (liquor subacetate of lead) with the tannin and opium, and gradually incorporate the petrolatum ointment with the mixture. This is particularly useful for granulated lids and chronic sore eyes.

Eye Salve.

Ammoniated Mercury, (White Precipitate),	240 grains
Morphine Sulphate,	20 grains
White Petrolatum Ointment,	8 ounces

Rub the ammoniated mercury and morphine to a very fine powder, and gradually incorporate the ointment intimately with the mixture.

Eye Salve.

Calamine,	1 ounce
Morphine Sulphate,	20 grains
White Petrolatum Ointment,	9 ounces

Rub the calamine and morphine together and gradually incorporate the ointment with the mixture.

FEET REMEDIES.

Remedies for corns, bunions and chilblains have been given under that heading. The following remedies are intended to make powders and liquids for perspiration and fetor of the feet, also for tender and sore feet:

Foot-Ease Powder.

A preparation similar to Foot-Ease, which is proprietary, may be made with

Boric Acid, in fine powder,	1 ounce
Talcum, powdered,	7 ounces

Mix them and use as a dusting powder inside the stocking.

Antiseptic Foot Powder.

Salicylic Acid,	$\frac{1}{2}$ ounce
Boric Acid, in fine powder,	1 ounce
Zinc Oxide,	1 ounce
Talcum, powdered,	$5\frac{1}{2}$ ounces

Mix and use as a dusting.

Foot-Sweat Powder.

Alum, in fine powder,	1 ounce
Boric Acid, in fine powder,	1 ounce
Talcum, powdered,	6 ounces
Coumarin,	10 grains

Mix and use as a dusting.

Foot-Fetor Liquid.

Alum, in powder,	1 ounce
Spirit of Camphor,	1 ounce
Carbolic Acid,	60 grains
Oil of Cloves,	15 minims
Alcohol,	6 ounces
Water,	8 ounces

Dissolve the alum in the water, add the spirit of camphor, carbolic acid and oil of cloves to the alcohol. Mix the solutions and use as a bath, letting it dry on the feet.

For Tender Feet.

Alum,	1 ounce
Boric Acid,	$\frac{1}{2}$ ounce
Tannin,	60 grains
Water, hot,	16 fl.ounces

Dissolve the salts in the hot water, allow to cool, and filter.

Tender Feet Powder or Tablets.

Alum, in powder,	12 ounces
Salicylic Acid,	1 ounce
Boric Acid, in powder,	1 ounce
Tannin, in powder,	1 ounce

Mix the powders thoroughly. A teaspoonful of the powder in 2 quarts of hot water as a bath for the feet. This powder may be put up in tablet form if desired.

FEMALE REMEDIES.

In the earlier history of patent medicines Female Remedies were but little known and, indeed, it was not until the Lydia Pinkham era that this class of medicines became prominent. Since then there has been no end to the preparations advertised or recommended for the diseases "peculiar to the female sex," and as a consequence, women have discovered that they have organs and ailments which were, to them, before practically unknown, and that there are remedies for their own complaints, which they cannot now do without, although, in the past, they had existed very comfortably without them. There is now quite a demand for put up medicines of this class and druggists find it profitable to supply that demand.

Aletris Cordial.

This is similar to the old Eclectic preparation known as "Mother's Cordial." The following formula will make a satisfactory preparation:

Unicorn Root, (Aletris),	8	ounces av.
Catnep Herb,	4	ounces av.
Cramp Bark,	4	ounces av.
Partridgeberry Leaves,	8	ounces av.
Blue Cohosh,	2	ounces av.
Cinnamon Bark,	1	ounce av.
Orange Peel,	1	ounce av.
Caraway Seed,	$\frac{1}{2}$	ounce av.
Sugar,	$2\frac{1}{2}$	pounds
Alcohol,	$2\frac{1}{2}$	pints
Water, sufficient to make	1	gallon

Grind the drugs to a coarse powder and macerate 24 hours with the alcohol mixed with an equal measure of water, then percolate, adding water after the liquid has disappeared from the surface of the drug, and continue the percolation with water until $6\frac{1}{2}$ pints are obtained; filter, dissolve the sugar in the filtrate and add enough water to make a gallon of the finished cordial.

Favorite Female Remedy.

Witch Hazel Bark,	8	ounces av.
Unicorn Root,	8	ounces av.
Senna Leaves,	6	ounces av.
Catnep Herb,	4	ounces av.
Life Root Plant, (Senecio Aureus),	4	ounces av.
Vervain Herb,	4	ounces av.
Black Haw Bark,	4	ounces av.
Cinnamon Bark,	$\frac{1}{2}$	ounce av.
Nutmeg,	$\frac{1}{2}$	ounce av.
Sugar,	8	ounces av.
Spirits of Nitre,	4	fl.ounces
Alcohol,	3	pints
Water, sufficient to make	1	gallon

Grind the drugs to a coarse powder, mix the alcohol with 3 pints of water, moisten the drugs with 2 pints of the mixture and pack firmly in the water-bath percolator, pour the remainder of the mixture upon the drugs and set in a warm place for 2 days; then heat moderately and, after 1 hour, begin to percolate, adding water to the drugs and continuing the heat and percolation until 7 pints are obtained; to this add the spirit of nitre, dissolve the sugar in the mixture, add enough water to make a gallon, allow to stand a few days and filter.

Female Remedy.**Women's Health Restorative.**

Cramp Bark, (<i>Viburnum Opulus</i>),	8	ounces av.
Catnep,	4	ounces av.
False Unicorn Root, (<i>Helonias</i>),	8	ounces av.
Senna Leaves,	8	ounces av.
Partridgeberry,	12	ounces av.
Saigon Cinnamon,	$\frac{1}{2}$	ounce av.
Nutmeg,	$\frac{1}{2}$	ounce av.
Spirit of Nitrous Ether,	4	fl.ounces
Sugar,	8	ounces av.
Alcohol,	3	pints
Water, sufficient to make	1	gallon

Grind the drugs to a coarse powder and, having mixed the alcohol with 3 pints of water, moisten the powder with 3 pints of the liquid, pack firmly in the water-bath percolator, pour upon it the remainder of the liquid and set in a warm place for 2 days, then heat moderately and after 1 hour begin to percolate, adding water to the drug after the liquid has all disappeared from the surface of the drugs, and continuing the percolation with water until $7\frac{1}{2}$ pints have been obtained; to this add the sugar and spirit of nitre; dissolve and filter.

This may be made from the fluidextracts instead of the drugs as follows: Fluidextract cramp bark, fluidextract false unicorn, fluidextract senna, each, 8 fl.ounces; fluidextract mitchella 12 fl.ounces; fluidextract catnep 4 fl.ounces; spirit of nitrous ether 4 fl.ounces; oil of cassia 20 minims; oil of nutmeg 30 minims; sugar 8 ounces av.; alcohol 2 pints; water sufficient to make 1 gallon.

Mix the fluidextracts and spirit of nitre, dissolve the oils in the alcohol and add to the solution 2 pints of water, mix this with the fluidextracts etc., dissolve the sugar in the mixture and add enough water to make 1 gallon.

The dose of this preparatin is from 1 to 2 teaspoonfuls four times a day.

Female Pills.

Under this title a great many pills are found on the market, most of them being indirectly advertised to "cure irregularities," and sold at an exorbitant price.

A variety of formulas for female pills will be found among the Pills, or the following may be used:

Ergotin,	100 grains
Extract Hellebore,	50 grains
Myrrh,	50 grains
Iron Sulphate,	50 grains
Aloin,	20 grains

Make into 100 pills. Dose 1 to 3 pills, two or three times a day.

GONORRHŒA CURES.

There is a fair demand for put up preparations for this disease, and several proprietary remedies have had an extensive sale. The most popular form now is a preparation to take, and an injection in one package. The following formulas will make very satisfactory preparations which may be put up either singly or together in one package:

Golden Emulsion.

Balsam Copaiba,	2 ounces
Spirit of Nitrous Ether,	2 ounces
Solution of Lime, (Lime Water),	4 ounces
Fluidextract Hydrastis, (Golden Seal),	$\frac{1}{2}$ ounce
Fluidextract Cubeb,	$\frac{1}{4}$ ounce
Syrup, sufficient to make	1 pint

Mix the balsam and spirit of nitrous ether together in a pint bottle, and add the lime water, shake them well together, then add the fluid-extracts and enough syrup to make a pint of the mixture, mix thoroughly and dispense with a shake label on the bottle.

Golden Injection.

Zinc Sulphate,	30 grains
Morphine Sulphate,	10 grains
Fluid Hydrastis,	2 ounces
Glycerin,	2 ounces
Water, sufficient to make	1 pint

Dissolve the salts in 6 ounces of water, add the fluid hydrastis and glycerin and enough water to make a pint.

HAY FEVER REMEDIES.

Most of the remedies for catarrh are equally good for hay-fever which is acute inflammation of the mucous membrane of the nasal and respiratory passages, also involving the eyes. The liquid preparations and ointments given under Catarrh Cures may be employed, also the following:

Hay Fever Remedy.

Boric Acid, in fine powder,	30 grains
Acetanilide, in fine powder,	30 grains
Morphine Sulphate,	8 grains
Glycerin,	1 fl.ounce
Distilled Water,	15 fl.ounces

Dissolve the salts in the water and glycerin, and use as a wash for the interior of the nose and for the eyes, and as a gargle for the throat. It may also be used to advantage with an atomizer.

HEADACHE REMEDIES.**Headache Powders.**

In the past few years headache powders have become prominent as proprietary medicines. The following formulas make very satisfactory preparations. Additions and changes may be made as desired, but the essential ingredients of the formulas should be maintained.

Acetanilide,	60 grains
Caffeine,	24 grains
Sodium Bicarbonate,	30 grains
Sugar,	120 grains

Mix thoroughly, and divide into twelve powders.

Acetanilide,	60 grains
Guarana, in powder,	60 grains
Sodium Bicarbonate,	30 grains
Sugar,	120 grains

Mix thoroughly and divide into twelve powders.

Acetanilide,	60 grains
Potassium Bromide, granular, (dry),	120 grains
Sugar,	1120 grains

Mix thoroughly and divide into twelve powders.

Headache Remedy.

The following is an excellent formula for a headache remedy in liquid form. It is specially valuable for chronic sick headache.

We think this form of medicine preferable to powders, but it is expensive to put up, in comparison with powders.

Caffeine,	128 grains
Potassium Bromide,	640 grains
Fluidextract Veratrum Viride,	2 fl.drachms
Fluidextract Guarana,	4 fl.ounces
Elixir, sufficient to make	1 pint

Rub the caffeine with a portion of the elixir and potassium bromide with another portion until nearly dissolved, mix the solutions, add the fluidextract and then enough elixir to make a pint.

The dose is a teaspoonful repeated every half hour until the headache is relieved.

HEART PREPARATIONS.

The sale for proprietary heart medicines has never been large. for the reason that people who have any trouble with this organ, if possible, seek the advice of physicians. A few preparations for heart trouble are found upon the market, all similar in composition.

Heart Corrector or Regulator.

Digitalis, in coarse powder,	1 ounce
Hyoscyamus, in coarse powder,	1 ounce

American Hellebore, (<i>Veratrum Viride</i>),	2 drachms
Diluted Alcohol, sufficient to make	1 pint

Percolate the drugs with the diluted alcohol until a pint of the tincture is obtained. The dose is from $\frac{1}{4}$ to 1 teaspoonful for palpitation or other disturbances of the heart.

HYPOPHOSPHITES COMPOUNDS.

Preparations of hypophosphites under various names have enjoyed an enviable reputation as proprietary medicines. First to claim prominent public attention was Churchill's Hypophosphites in the form of solution, afterwards Syrups of Hypophosphites of Lime, Soda, Potassa, Iron, and other salts in various combinations came into use, and more recently the combination of these hypophosphites with quinine, strychnine etc., have usurped the field, and hold the front place as proprietary hypophosphite preparations, as well as being extensively used in the practice of physicians. The formulas will be found under Solutions and Syrups, Part II.

INHALANTS AND INHALERS.

Inhalants are designed to be used by being vaporized in inhalers specially designed for that purpose, and are employed for the relief or cure of asthma, catarrh, colds, bronchitis, hay-fever and other diseases affecting the air passages. A great variety of inhalers are made, the most convenient and practical being those which admit of the passage of air through tubes of paper, wood or other absorbing substance or loose fibrous material which is saturated with the inhalant. The air then being drawn through these saturated tubes or substances carries the vapor of the inhalant to the diseased part, where it exerts its curative action. Other forms of inhalers are those by which a current of air is made to pass through a solution of some volatile medicinal substance contained in a bottle.

The following inhalants may be put up as proprietary.

Carbolate of Iodine Inhalant.

Carbolic Acid, (crystals),	120 grains
Glycerin,	1 drachm
Tincture Iodine,	3 drachms
Camphor, in powder,	90 grains

Dissolve the carbolic acid in the glycerin, add the tincture of iodine and camphor, and then add water of ammonia, drop by drop, until the solution is nearly colorless.

Excelsior Inhalant.

Carbolic Acid, (crystals),	1 $\frac{1}{4}$ ounces av.
Camphor,	2 ounces av.
Oil of Eucalyptus,	$\frac{1}{4}$ fl.ounce

Oil of Sassafras,	I	fl.drachm
Oil of Tar,	I	fl.drachm
Oil of Hemlock,	I	fl.drachm
Mix and dissolve.		

This is an excellent inhalant, and may be put up by any other name than the one used in the title. It is used for catarrh etc.

Lightning Inhalant.

(Bottled Electricity).

An inhaler made from a tall, half-ounce or ounce wide-mouth bottle or tall tin box in the bottom of which is packed some cotton or other absorbent upon which is poured a liquid which vaporizes readily, the vapor of which is very penetrating, has been quite popular for selling on the streets by fakers.

The liquid may be made as follows:

Essential Oil of Mustard,	I	drachm
Oil of Tar,	2	drachms
Oil of Sassafras,	I	ounce
Oil of Wintergreen,	I	ounce
Oil of Hemlock,	I	ounce
Menthol,	I	drachm

Mix them and when desired to use drop a few drops in an inhaler. The vapor is very penetrating.

Menthol Inhalers.

Menthol inhalers are made by inclosing crystallized menthol or pip-menthol loosely packed in a glass tube which may be opened at both ends. The air being inhaled through the tube is charged with the menthol vapor. These inhalers are used chiefly for headache. A solution of menthol may also be prepared by dissolving 1 ounce of menthol in 8 ounces of alcohol. This may be used with any of the ordinary forms of tubular inhalers.

INJECTIONS.

Injections which are sold as proprietary medicines are mostly for private diseases, but in regular pharmacy hypodermic injections of apo-morphine, ergotin and morphine are official in the Br. P., and many others are prescribed or employed by physicians in their practice. In this department the proprietary injections only will be noticed.

Injection Brou.

Acacia, in coarse powder,	2	drachms
Calamine,	I	drachm
Zinc Acetate,	I	drachm
Tincture of Catechu,	4	fl.drachms
Tincture of Opium and Saffron,	4	fl.drachms
Water, sufficient to make	I	pint

Dissolve the acacia and zinc acetate in the water and triturate with the calamine in a mortar, then add the tinctures. This is to be shaken before using. Ordinary laudanum may be used instead of the tincture of opium and saffron.

Rose Injection or Rose Wash.

Zinc Sulphate,	1 drachm
Tincture of Catechu,	4 fl.drachms
Tincture of Opium,	4 fl.drachms
Glycerin,	1 fl.ounce
Rose Water,	14 fl.ounces
Mix them.	

Compound Hydrastis Injection.

Fluid Hydrastis, or Aqueous Fluidextract	
Hydrastis,	1 fl.ounce
Zinc Sulphate,	1 drachm
Glycerin,	1 fl.ounce
Tincture of Catechu,	4 fl.drachms
Rose Water,	14 fl.ounces
Mix them.	

IODIDE ALTERATIVES.

The following preparations have been popular as proprietary medicines with published formulas of composition, and sold mainly by prescription of physicians.

Iodide of Potassium Elixir Compound.

"Iodia" — Alterative Elixir.

Under the name "Iodia," Battle & Co., Chemists Corporation, of St. Louis, have made and sold an alterative preparation, claiming that it contains certain alterative drugs combined with potassium iodide and iron phosphate. A good preparation of this kind, containing similar ingredients as is claimed for this, may be made as follows:

Stillingia, in coarse powder,	2 ounces av.
Prickly-Ash Bark, in coarse powder,	$\frac{1}{4}$ ounce
Saxafraga, in coarse powder,	1 ounce
Yellow Parilla, in coarse powder,	1 ounce
Blue Flag, in coarse powder,	$\frac{1}{4}$ ounce
Soluble Iron Phosphate,	128 grains
Diluted Alcohol,	16 fl.ounces
Water, sufficient to make	1 pint

Mix the powdered drugs and percolate with the diluted alcohol first, and then with water until 15 fl.ounces are obtained. Dissolve the potassium iodide in the tincture and the iron salt in 1 ounce of hot water, and gradually add the tincture to the iron solution, and after standing, filter.

Elixir Iodides and Bromides of Calcium Compound.

"Elixir Iodo-Bromide of Calcium Compound."

Under the title "Elixir Iodo-Bromide of Calcium Compound," Tilden & Co., of New Lebanon, have had an extensive sale for an alterative compound, claiming it to contain many valuable alterative salts and medicines. The following formula was suggested by C. S. Hallberg of Chicago, in a paper read before the Illinois Pharmaceutical Association at Bloomington, Ill.

Calcium Bromide,	256 grains
Sodium Iodide,	256 grains
Potassium Iodide,	256 grains
Magnesium Chloride,	256 grains
Fluidextract Sarsaparilla Compound,	2 ounces
Fluidextract Stillingia Compound,	2 ounces
Elixir Orange,	4 ounces
Sugar,	4 ounces
Water, sufficient to make	1 pint

Dissolve the salts in the water, add the sugar, and to this syrup add the fluidextracts previously mixed with the elixir orange. After standing 2 days, filter, adding water to make the measure 16 fl.ounces.

KIDNEY AND LIVER REMEDIES.

Among modern proprietary medicines, kidney and liver cures stand preëminently at the front as examples of what advertising will do. There have been kidney remedies and liver remedies, and the two combined, long before Warner entered the field with the Safe Liver and Kidney Cure. But his advertising seemed to have opened a new vein, and the people who read discovered that they had difficulties of which they were before ignorant.

A colossal fortune was made in a short time, and as quickly spent, but the demand for kidney and liver cures, although considerably diminished, still continues, and will continue for decades to come.

Many of the remedies designed to act on the kidneys and liver are noticed under other headings, and only those which are known in the market by the name of Kidney and Liver Remedies or Cures, or by other similar titles are included in this section.

There has always been a good demand for proprietary remedies for diseases of the kidneys, bladder and urinary organs. In the earlier days, Vaughn's Lithontriptic, and Constitution Water were popular. More recently Helmbold's and other buchu preparations had a big run; still more lately Diuretic Elixirs of various kinds and Kidney Pills have had their day, and now a large family of Liver and Kidney medicines have swept everything else out of the way, and are having

the market all to themselves. So extensively have some of these late remedies been advertised and pushed, that it is now difficult to find a man, woman or child who has not some serious kidney difficulty.

In making the formulæ for these preparations we would have preferred to confine their use to the kidneys, bladder and urinary organs, but we must follow the fashion and include the liver also.

The formulæ following make preparations similar to those most popular in the market, and are representatives of different kinds of kidney and liver remedies.

Diuretic Cordial, Kidney and Liver Remedy.

Liverwort herb, (Hepatica),	16	ounces av.
Dandelion Root,	8	ounces av.
Digitalis Leaves,	1	ounce av.
Hydrangea Root,	4	ounces av.
Wintergreen, herb,	2	ounces av.
Potassium Nitrate,	3	ounces av.
Sugar,	12	ounces av.
Alcohol,	1½	pints
Menthol,	5	grains
Water, sufficient to make	1	gallon

Grind the herbs etc., to a coarse powder and, having mixed the alcohol with 4 pints of water, moisten the powder with 2 pints of the mixture and macerate in a covered vessel for 24 hours; then transfer to the water-bath percolator, pack moderately, pour upon it the remaining portion of the liquid and set in a warm place for 1 day; then heat very moderately and, after 1 hour, begin to percolate, adding water through the percolator after the liquid has disappeared from the surface, and continuing the heat and percolation until 7½ pints have passed; in this dissolve the potassium nitrate and sugar and, after standing a few days, filter.

This may be made by the ordinary method of percolation, but the water-bath percolation is preferable.

If it is desired to use fluidextracts instead of drugs, the formula is as follows: Fluidextract of liverwort 16 fl.ounces, fluidextract or dandelion 8 fl.ounces, fluidextract of digitalis 1 fl.ounce, essence of wintergreen 1 fl.drachm, potassium nitrate 3 ounces av., sugar 12 ounces av., alcohol 10 fl.ounces, menthol 5 grains, water 5 pints.

Mix the fluidextracts, alcohol and water, and add the essence of wintergreen and menthol; dissolve the sugar and nitre in the liquid and filter.

This is very similar to, but considerably stronger than the "Safe" cure. The usual dose is from a dessertspoonful to a tablespoonful, the latter containing about 5 grains of potassium nitrate.

Kidney and Liver Remedy.

Dandelion Root,	12 ounces av.
Buchu Leaves, short,	8 ounces av.
Liverwort, herb,	8 ounces av.
Hydrangea Root,	4 ounces av.
Spirit of Nitrous Ether,	8 fl.ounces
Sugar,	12 ounces av.
Alcohol,	2 pints
Water, sufficient to make	1 gallon

Grind the drugs to a coarse powder and, having mixed the alcohol with 4 pints of water, moisten the powder with 2 pints of the mixture and macerate in a covered vessel for 24 hours; transfer to the water-bath percolator, pack moderately, pour upon it the remainder of the liquid and set in a warm place for 1 day, then heat very moderately, and after 1 hour begin to percolate, adding water to the drugs after the liquid has disappeared, and continuing the heat and percolation until 7 pints have passed; to this add the spirit of nitre and sugar, and enough water to make a gallon, and after standing a few days, strain.

This may be made by the ordinary process of percolation instead of by water-bath. The dose is a dessertspoonful to a tablespoonful.

It may be made from fluidextracts by taking fluidextract of dandelion 12 fl.ounces, fluidextract of buchu 8 fl.ounces, fluidextract of liverwort 8 fl.ounces, fluidextract of hydrangea 4 fl.ounces, spirit of nitre, sweet, 8 fl.ounces; sugar 12 ounces av., alcohol 1 pint, water 4½ pints.

Mix, dissolve the sugar, and filter.

Buchu Compound.

Buchu Leaves, short,	12 ounces av.
Liverwort, herb,	4 ounces av.
Juniper Berries,	8 ounces av.
Hydrangea Root,	4 ounces av.
Potassium Acetate,	4 ounces av.
Spirit of Nitrous Ether,	4 fl.ounces
Sugar,	12 ounces av.
Alcohol,	2½ pints
Water, sufficient to make	1 gallon

Grind the drugs to a coarse powder and, having mixed the alcohol with 4 pints of water, moisten them with 2 pints of the mixture and macerate in a closed vessel for 24 hours; transfer to the water-bath percolator, pack moderately, pour upon them the remainder of the liquid, and set in a warm place for 1 day, then heat very moderately and, after 1 hour, begin to percolate, adding water to the drugs after the liquid has disappeared from the surface, and continue the heat and percolation until 7¼ pints have passed; in this dissolve the sugar and potassium acetate and, after standing a few days, filter.

This is somewhat similar to the diuretic elixir, buchu, juniper, and potassium acetate, which has been quite popular.

Nephritic Compound.

Buchu Leaves, short,	12 ounces av.
Hydrangea Root,	12 ounces av.
Digitalis Leaves,	3 ounces av.
Juniper Berries,	8 ounces av.
Potassium Nitrate,	3 ounces av.
Essence of Wintergreen,	1 fl.ounce
Alcohol,	3 pints
Water, sufficient to make	1 gallon

Grind the drugs to a coarse powder, moisten them with sufficient alcohol and water mixed in equal quantities by measure, and macerate for 24 hours, then transfer to a water-bath percolator, pack firmly, cover with a mixture of about equal measures of alcohol and water, heat moderately and percolate with the same until the quantity of alcohol which is directed is used; then add water to the drugs and continue the percolation, until 1 gallon of the percolate is obtained. Dissolve the nitrate of potassium in this and filter.

The dose is a dessertspoonful to a tablespoonful as a remedy for kidney troubles.

Kidney and Liverwort Tea.

Liverwort, herb, cut,	8 ounces
Dandelion Root, cut,	4 ounces
Digitalis Leaves, cut,	2 ounces
Peppermint, herb, cut,	1 ounce
Wintergreen, herb, cut,	1 ounce
Nitrate of Potassium, in powder,	3 ounces

Mix thoroughly and put up in packages holding about 2 ounces.

Directions for use: Steep the contents of the package in a quart of water, with gentle heat, for 2 hours, then strain off $1\frac{1}{2}$ pints, and add to it half a pint of alcohol and 2 ounces of sugar. Adult dose of this preparation a wineglassful (1 fl.ounce) four times a day.

Kidneywort. A proprietary medicine by this title is put up by Wells, Richardson & Co., of Burlington, Vt., both in a liquid and dry form. The dry kidneywort is a mixture of drugs, as dandelion, hydrangea etc., and extract of other drugs, with roasted beans, coarsely ground. The liquid contains the strength of similar medicinal ingredients.

Kidney Pills.

In the form of pills some remedies for kidney troubles are now in considerable demand. The following formula will make a satisfactory preparation:

Potassium Nitrate, in powder,	150 grains
Extract of Digitalis,	75 grains
Extract of Squill,	40 grains
Extract of Juniper,	75 grains
Make 100 pills. Dose 1 to 3 pills four times daily.	

LINIMENTS.

Proprietary preparations that are sold as liniments may naturally be divided into two classes: **A.** Those that are intended for internal and external use, and **B.** Those intended for external use only. The former are used the same as the balms and pain killers as general panaceas, and consist mostly of oil or volatile substances dissolved in alcohol or similar solvents; the latter are usually mixtures of volatile oil and substances with some fixed or mineral oil, and are used externally for pain, swellings, sores etc.

CLASS A.—For External and Internal Use.

Arnica Liniment.

Arnica Flowers,	16	ounces av.
Smartweed Herb,	18	ounces av.
Marigold Flowers,	4	ounces av.
Oil of Sassafras,	3	fl.ounces
Oil of Hemlock,	1	fl.ounce
Oil of Origanum,	$\frac{1}{2}$	fl.ounce
Camphor,	1	ounce av.
Alcohol,	7	pints
Water, a sufficient quantity to make	1	gallon

Reduce the drugs to a coarse powder and pack firmly in a water-bath percolator. Pour upon them 4 pints of alcohol, and macerate in a warm place for 24 hours, then heat very moderately for 1 hour and begin to percolate slowly, adding first the remaining 3 pints of alcohol, and when this has disappeared from the surface continue the percolation with water until $7\frac{1}{2}$ pints have passed. To this percolate add the oils and camphor and dissolve; filter if necessary. This is for external and internal use.

Cocaine Liniment.

Cocaine Hydrochloride,	30 grains
Oil of Hemlock,	1 fl.ounce
Oil of Sassafras,	1 ounce
Alcohol,	14 fl.ounces

Mix and dissolve. The dose is 20 to 30 minims. It is also used externally for pains etc.

Eclectric Oil.

The following formula has been published as similar to Thomas':

Camphor,	$\frac{1}{2}$ ounce
Oil Gaultheria,	$\frac{1}{2}$ ounce
Oil Origanum,	$\frac{1}{2}$ ounce
Chloroform,	1 ounce
Laudanum,	1 ounce
Oil Sassafras,	1 ounce
Oil Hemlock,	1 ounce
Oil Turpentine,	1 ounce
Balsam Fir,	1 ounce
Tincture Guaiacum,	1 ounce
Tincture Catechu,	1 ounce
Alcohol,	4 pints

Alkanet, sufficient to color.

Several other formulas are given in this work which make preparations similar to this.

Eclectric Liniment.

Oil of Origanum,	2 fl.ounces
Oil of Hemlock,	4 fl.ounces
Oil of Turpentine,	4 fl.ounces
Oil of Sassafras,	2 fl.ounces
Oil of Amber,	$\frac{1}{2}$ fl.ounce
Camphor,	2 ounces av.
Capsicum, in fine powder,	1 ounce av.
Myrrh, in fine powder,	1 ounce av.
Water of Ammonia,	4 fl.ounces
Alcohol, sufficient to make	1 gallon

Mix and macerate for 7 days, then filter.

For external or internal use.

Hunn's Life Drops.

Oil of Cajuput,	1 fl.ounce
Oil of Anise,	1 fl.ounce
Oil of Cloves,	1 fl.ounce
Oil of Peppermint,	1 fl.ounce
Alcohol,	4 fl.ounces

Dissolve the oils in the alcohol. This is used as a quick stimulant. The dose is 10 to 20 drops on sugar.

Indian Liniment.

Oil of Sassafras,	1 ounce
Oil of Origanum,	1 ounce
Oil of Hemlock,	1 ounce

Tincture of Capsicum,	2 ounces
Oil of Pennyroyal,	1 ounce
Alcohol,	26 ounces

Mix them. This is a popular general panacea for pain, colic etc. Dose 20 to 30 minims or more.

Menthol Liniment.

Menthol,	1 ounce
Tincture of Capsicum,	4 ounces
Sulphate of Morphine,	30 grains
Alcohol,	27 ounces

Mix and dissolve. This is used externally for pain, rheumatism, headache etc., and may be taken in doses of 20 to 30 minims.

Pain-I-Cure.

This is quite similar to the popular remedies used as pain-killers. It is a hot, stimulating liniment, for internal and external use. Pain Killer is claimed as a trade mark, but druggists may use any title as above.

Guaiaic Resin,	1 ounce
Camphor,	2 ounces
Capsicum, in powder,	1 ounce
Alcohol,	30 ounces

Mix and macerate, with frequent agitation for 7 days, then filter. The addition of hemlock oil $\frac{1}{2}$ ounce, and sassafras oil 1 ounce, to this quantity is an improvement.

Ready Relief.

Druggists have no right to use the title "Ready Relief" on their wrappers and labels, as it is claimed as proprietary by Radway & Co. This formula, however, makes a satisfactory preparation.

Camphor,	3 ounces av.
Capsicum,	8 ounces av.
Oil of Turpentine,	2 fl.ounces
Stronger Ammonia Water,	8 fl.ounces
Alcohol,	1 gallon

Mix and macerate for a week, shaking daily, then filter.

Seven Seals.

Ether,	3½ fl.drachms
Chloroform,	5 fl.drachms
Camphor,	3½ fl.drachms
Oil of Peppermint,	½ drachm
Tincture of Capsicum,	3½ ounces
Alcohol, 90%,	5 ounces

Mix and dissolve. For internal or external pains.

Thymol-Chloral Liniment.

Thymol,	1 ounce
Chloral Hydrate,	1 ounce
Tincture of Capsicum,	4 ounces
Alcohol,	26 ounces

Mix, dissolve and filter. For rheumatism, pain etc. Dose 20 to 30 minims when taken.

Smartweed Compound or Extract.

Smartweed, leaves or herb,	20 ounces av.
Alcohol,	6 pints
Water,	2 pints
Camphor,	6 drachms
Oil of Hemlock,	1 fl.drachm
Oil of Sassafras,	1 fl.ounce

Grind the smartweed to a coarse powder and moisten it with 1 pint of the alcohol, pack tightly in a percolator and pour upon it the remaining alcohol; cover closely and allow to stand 4 days; begin the percolation and when no more alcohol remains on top of the drug, add the water. When the liquid has ceased to drop, press out what remains in the drug in the percolator and add to the last portion.

In the 4 pints first obtained by percolation (before the water is added to the drug in the percolator), dissolve the camphor and oils, and when the last portion of the percolate and that from the pressure is obtained, add it gradually to the portion in which the oils etc., have been dissolved and filter, adding alcohol enough to make 1 gallon. For external and internal use.

Wizard Liniment.

Oil of Sassafras,	8 fl.ounces
Oil of Cloves,	2 fl.ounces
Oil of Turpentine,	4 fl.ounces
Stronger Water of Ammonia,	1 fl.ounce
Ether, (Sulphuric),	4 fl.ounces
Chloroform,	1 fl.ounce
Camphor,	2 ounces av.
Alcohol, sufficient to make	1 gallon

Mix and dissolve.

For internal or external use.

Under the title Wizard Oil, Wizard Liniment, Wizard Balm, Golden Relief, Golden Oil, and by many other similar names, a class of preparations for internal and external use are largely sold. In the preceding pages many good formulas for such preparations will be found under various titles. They are mostly compounds of aromatic oils with camphor and chloroform or ether, and act as prompt and diffusive remedies to relieve cramp, pain etc. The profit on these preparations

is large and as they may be readily prepared there is no reason why druggists should not as well secure it to themselves as to pay it to others. There is always a ready demand for such preparations.

CLASS B.—For External Use Only.

Fluid Lightning.

Aconitine or Veratrine,	1 grain
Essential Oil of Mustard,	1 drachm
Glycerin,	1 ounce
Alcohol,	4 ounces

Mix. This is a valuable external preparation for headache, neuralgia, rheumatism and all nervous pains.

"Gargling Oil" Liniment.

Camphor,	8 ounces av.
Oil of Amber,	2 fl.ounces
Origanum Oil,	1 fl.ounce
Carbolic Acid,	4 ounces av.
Oil of Turpentine,	3 pints
Crude Petroleum Oil,	4 pints
Stronger Water of Ammonia,	2 fl.ounces

Mix and dissolve.

This is somewhat like, but we think a much better preparation than Gargling Oil.

Iodide of Ammonium Liniment.

Iodine,	1 drachm
Camphor,	$\frac{1}{2}$ ounce
Oil Rosemary,	2 drachms
Oil Lavender,	2 drachms
Ammonia Water, q. s., or	1 ounce
Alcohol,	1 pint

Dissolve the iodine in the alcohol and add the camphor and the oils, then add ammonia water enough to remove the dark color of the mixture, or change it to a light straw color.

Low's Magnetic Liniment.

The following formula has been published: Oil of turpentine, stronger ammonia water, each, 90 parts; tincture capsicum 10 parts, spirit of camphor 960 parts, oil of sassafras 6 parts, fluidextract of sassafras 40 parts, alcohol 180 parts. Mix and dissolve.

Mexican Liniment.

Olive Oil,	2 pints
Camphor,	2 ounces
Oil Origanum,	1 ounce

Oil Sassafras,	1 ounce
Ammonia Water,	8 ounces

Dissolve the camphor in the oils and mix with the ammonia water.

Nerve and Bone Liniment.

Oil of Origanum,	1 fl.ounce
Oil of Rosemary,	1 fl.ounce
Oil of Amber,	1 fl.ounce
Oil of Hemlock,	1 fl.ounce
Camphor,	4 ounces av.
Oil of Turpentine,	3 pints
Linseed Oil,	5 pints

Mix and dissolve.

"Polyform" or Neuralgia Liniment.

Chloral Hydrate,	1 ounce av.
Alcohol,	4 fl.ounces
Chloroform,	2 $\frac{1}{4}$ fl.ounces
Ether,	2 fl.ounces
Camphor,	2 ounces av.
Oil of Peppermint,	5 minims
Oil of Cloves,	5 minims
Salicylic Acid,	5 grains
Amyl Nitrite,	5 grains
Morphine Sulphate,	5 grains

Mix and dissolve. Used for neuralgia, tic d'oreaux etc.

Ready Oil Liniment.

Oil Origanum,	1 fl.ounce
Oil Sassafras,	1 fl.ounce
Oil Hemlock,	1 fl.ounce
Chloroform,	4 fl.drachms
Camphor,	1 ounce av.
Neutral Paraffin Oil,	12 fl.ounces

Mix the oils and dissolve the camphor in the mixture. Cotton seed oil or linseed oil may be used instead of the paraffin oil.

This is a good general liniment.

Rheumatic Liniment.

Oil of Sassafras,	6 fl.ounces
Oil of Origanum,	4 fl.ounces
Oil of Cedar,	2 fl.ounces
Oil of Amber,	1 fl.ounce
Camphor,	8 ounces av.
Oil of Turpentine, sufficient to make	1 gallon

Mix and dissolve.

This is said to be quite similar to the preparation known as "St. Jacob's Oil."

"Spavin Cure."

This comes properly under the head of Liniments, but it is chiefly used in veterinary practice. It is, however, an excellent absorbent liniment for man or beast. An excellent application for swellings or lameness of any kind, but it must not be used internally.

Camphor,	4 ounces av.
Oil of Turpentine,	4 fl.ounces
Tincture of Iodine,	4 fl.ounces
Bichloride of Mercury,	30 grains
Oil of Spike,	2 fl.ounces
Oil of Amber,	2 fl.drachms
Mix and dissolve.	

Stoke's Liniment.

Oil of Turpentine,	3 fl.ounces
Oil of Lemon,	60 minims
Acetic Acid,	$\frac{1}{2}$ fl.ounce
Yolk of egg,	one
Rose Water,	3 fl.ounces
Shake the oils with the yolk of egg and acid in a bottle until they are well mixed.	

Veterinary Liniment.

Oil of Amber,	2 fl.ounces
Camphor,	4 ounces av.
Carbolic Acid,	3 ounces av.
Oil of Sassafras,	4 fl.ounces
Oil of Tar,	2 fl.ounces
Oil of Turpentine,	2 pints
Crude Petroleum,	5 pints
Mix and dissolve.	

Wonder Liniment.

Capsicum,	1 ounce
Wintergreen Oil,	2 ounces
Sassafras Oil,	1 ounce
Hemlock Oil,	1 ounce
Mustard Oil, essential,	1 drachm
Gasoline,	1 gallon
Mix, macerate for 7 days, and filter. Keep away from fire or light.	

LIQUOR AND HABIT CURES.

The so-called "Gold Cures" for liquor and drug addiction have been very prominent for a considerable time past. Keeley Cure Institutes have been established throughout the United States and foreign countries, and have been quite successful in the treatment of inebriety

and like diseases. The following formulas are similar to those used in these institutions:

Gold Cure Tonic.

Fluidextract of Columbo,	2 ounces
Fluidextract of Golden Seal,	2 ounces
Tincture of Aloes,	1 ounce
Tincture of Cinnamon,	4 drachms
Tincture of Capsicum,	4 drachms
Tincture of Cinchona Compound,	1 ounce
Glycerin,	3 ounces
Water,	7 ounces

Mix them. Dose a dessertspoonful 4 times a day. This is to be taken throughout the treatment, during four weeks or more.

Gold Cure Hypodermic Injection No. 1.

Pilocarpine Hydrochloride,	10 grains
Boric Acid,	2 grains
Distilled Water,	1 fl.ounce

Dissolve. This is to be used by hypodermic injection, 10 to 12 minims, 3 times a day during the first week's treatment.

Gold Cure Hypodermic Injection No. 2.

Strychnine Sulphate,	$\frac{1}{2}$ grain
Atropine Sulphate,	$\frac{1}{4}$ grain
Boric Acid,	15 grains
Distilled Water,	4 fl.ounces

Mix and dissolve.

This is to be used after the first week's treatment.

The Black Shot.

If the patient ceases to want liquor after using the Injection No. 1 for 4 or 5 days this will not be needed, but if the desire for drink still persists, give the following:

Apomorphine Hydrochloride, $\frac{1}{4}$ grain
dissolved in enough water for a hypodermic injection. If the patient is very strong, double the quantity.

MIXTURES.

A great many preparations, introduced by celebrated physicians, are known as "mixtures," and are designated by the names of physicians who originated them. The following are a few of the more popular "mixtures" of this kind.

Bert's Antineuralgic Mixture. Potassium iodide 2 drachms, tincture of opium 2 drachms, fluidextract gelsemium 3 drachms, fluidextract black cohosh 5 drachms, syrup sarsaparilla compound 3 ounces, water, sufficient to make 8 ounces. Mix and dissolve. Dose a tablespoonful every 4 hours, for pectoral neuralgia and muscular rheumatism.

Brown-Séquard's Anti-Epileptic Mixture. Sodium bromide 360 grains, potassium bromide 360 grains, ammonium bromide 360 grains, potassium iodide 180 grains, ammonium iodide 180 grains, ammonium carbonate 120 grains, tincture of columba 3 fl.ounces, water sufficient to make a pint. Dose $1\frac{1}{2}$ teaspoonfuls before meals, 3 teaspoonfuls at bed-time.

Fothergill's Asthma Mixture. Ammonium iodide 240 grains, ammonium bromide 360 grains, syrup of tolu 6 fl.ounces, tincture of lobelia 10 fl.ounces. Mix and dissolve. Dose a teaspoonful.

Hope's Camphor Mixture. Tincture of opium 80 minims, nitrous acid 120 minims, camphor water, a pint. Dose a tablespoonful every 2 hours, for dysentery.

Paris' Carminative Mixture. Calcined magnesia $\frac{1}{2}$ ounce av., peppermint water $2\frac{1}{2}$ fl.ounces, compound tincture of lavender $\frac{1}{2}$ fl.ounce, spirit of caraway 4 fl.ounces, syrup of ginger 2 fl.ounces. Mix. Dose 2 to 4 fl.drachms.

Richard's Chalk Mixture. Precipitated chalk 480 grains, sugar 410 grains, tincture of opium 1 fl.drachm, spirit of cinnamon 15 minims, compound tincture of lavender 1 fl.ounce, tincture of kino 1 fl.ounce, water 3 fl.ounces. Mix them. Dose a teaspoonful or more.

Jackson's Cholera Mixture. Spirit of lavender compound 2 fl.ounces, spirit of camphor 2 fl.ounces, tincture of opium 1 fl.ounce, spirit of ether, compound, 1 fl.ounce. Mix them. Dose $\frac{1}{2}$ to a teaspoonful.

Copaiba, Santal and Cubeb Mixture.—Nesbit's Specific. Oil of santal 5 fl.drachms, oil of copaiba 4 fl.drachms, oil of cubeb 4 fl.drachms, oil of pimenta 1 fl.drachm, oil of cassia 1 fl.drachm, alcohol sufficient to make 16 fl.ounces. Mix and dissolve. Dose a teaspoonful in water or syrup.

Alkaline Copaiba Mixture. Copaiba 4 fl.drachms, acacia 240 grains, sugar 240 grains, solution of potassa 4 fl.drachms, spearmint water, sufficient to make 8 fl.ounces. Mix the copaiba and solution of potassa and rub with the water, acacia etc.

Chapman's Copaiba Mixture. Copaiba 4 fl.ounces, acacia, powdered, 120 grains, sugar 60 grains, spirit of nitrous ether 4 fl.ounces, compound tincture of lavender 2 fl.ounces, tincture of opium 1 fl.drachm, distilled water 4 fl.ounces. Mix. Dose a tablespoonful.

Jackson's Cough Mixture or Syrup. Sassafras pith 60 grains, gum arabic 1 ounce av., white sugar 28 ounces av., muriate of morphine 8 grains, water 1 pint or sufficient. Put the sassafras pith and gum arabic in the water and let stand 12 hours, with frequent stirring, then strain and dissolve the sugar in the liquid by stirring. Dose a teaspoonful.

Pancoast's Cough Mixture. Wild cherry bark 240 grains, senega 240 grains, ipecac 120 grains, extract of conium 15 grains, compound tincture of cardamom 1 fl.ounce, compound spirit of juniper 1 fl.ounce,

water sufficient to make 10 fl.ounces. Rub the extract of conium with the percolate and add the other ingredients. Dose 1 to 2 teaspoonfuls.

Gould's Diarrhœa Mixture. Compound tincture of rhubarb 1 fl.ounce, tincture of opium 4 fl.drachms, spirit of camphor 2 fl.drachms, ammonia water 1 fl.drachm, oil of peppermint 30 minims. Mix them. Dose a teaspoonful in hot sweetened water.

Squibb's Diarrhœa Mixture.—**Compound Tincture of Opium.** Tincture of opium 1 fl.ounce, tincture of capsicum 1 fl.ounce, spirit of camphor 1 fl.ounce, purified chloroform 3 fl.drachms, alcohol sufficient to make 5 fl.ounces. Mix them. Dose 20 to 60 minims.

Velpeau's Diarrhœa Mixture. Tincture of opium 1 fl.ounce, tincture of rhubarb 1 fl.ounce, camphorated tincture of capsicum $\frac{3}{4}$ fl.ounce. Mix them. Dose 20 to 60 minims.

Laville's Gout Mixture. Quinine sulphate 30 grains, sulphate cinchonine 22 grains, extract of colocynth 195 grains, diluted alcohol 3 fl.ounces, red wine, sufficient to make 16 fl.ounces. Mix them and dissolve. The dose is a tablespoonful.

Tully's Iron and Conium Mixture. Iron subcarbonate 600 grains, extract of conium 300 grains, sugar 8 ounces, oil of cassia 18 minims, oil of gaultheria 20 minims, compound tincture of cinnamon 2 fl.ounces, tincture of tolu 4 fl.drachms, water sufficient to make a pint. Mix them.

Mistura Oleo-Balsamica. Hoffmannscher Lebensbalsam. P. G. Oil of lavender, oil of cloves, oil of cinnamon, oil of thyme, oil of lemon, oil of nutmeg, ethereal, each 1 part; balsam peru 4 parts, alcohol 240 parts. Mix, dissolve and filter.

Gadberry's Spleen Mixture. Potassium nitrate 300 grains, quinine sulphate 65 grains, iron sulphate 65 grains, nitric acid 65 minims, water sufficient to make a pint. Mix them and dissolve. Dose a tablespoonful 3 times a day.

Townsend's Mixture. (New-York Hospital). Red mercuric iodide 1 grain, potassium iodide 300 grains, syrup of orange peel 2 fl.ounces, compound tincture of cardamom 2 fl.drachms, water sufficient to make 4 fl.ounces. Dose 1 to 4 teaspoonfuls for syphilis.

NEBULIZING LIQUIDS.

The following liquids are designed to be used in a nebulizing apparatus or in the ordinary oil atomizers. Different solutions are required for spraying atomizers, which are designed for alcoholic or aqueous liquids.

Antiseptic Nebulizer Liquid No. 1.

Oil of Pine Needles, or Scotch Pine,	2 fl.drachms
Eucalyptol,	4 fl.drachms
Menthol,	60 grains

Oil Cassia,	1 fl.drachm
Tincture Balm of Gilead Buds,	4 fl.drachms
Tincture of Benzoin, q. s. to make	16 fl.ounces

This is an antiseptic stimulant to the respiratory passages, and is a basis to which many other substances may be added as desired.

Asthma, Hay Fever, Etc., Nebulizer Liquid No. 2.

Cocaine Hydrochloride,	15 grains
Camphor,	60 grains
Quinine Hydrochloride,	120 grains
Antipyrine,	20 minims
Formula No. 1, q. s. to make	4 ounces

Dissolve the salts in the liquid.

This is an excellent remedy for hay fever, asthma, whooping cough, diphtheria, croup etc.

Catarrhal Nebulizer Liquid No. 3.

Eucalyptol,	120 minims
Oil of Cassia,	40 minims
Oil of Gaultheria,	40 minims
Menthol,	40 grains
Alboline, or Mineral Glycerin, q. s. to make	4 ounces

Mix. This is a good basis for the oil nebulizer, and an excellent remedy for dry catarrh of the nose and throat.

Pulmonary Nebulizer Liquid No. 4.

Iodine,	30 grains
Creosote,	60 grains
Camphor,	60 grains
Oil of Tar,	40 minims
Formula No. 1, sufficient to make	4 ounces

Mix and dissolve. This is employed as a remedy for advanced catarrh, laryngeal and pulmonary tuberculosis etc.

Nebulizer Liquid for Inflammation No. 5.

Cocaine,	8 grains
Oil Cassia,	30 minims
Menthol,	60 grains
Camphor,	60 grains
Alboline, or Mineral Glycerin, to make	4 ounces

Mix. This is useful for inflammation of the throat and middle ear passages.

A great variety of nebulizing liquids for various purposes may be made by the addition of medicinal substances to Nos. 1 and 3.

NERVINES, HYPNOTICS AND SEDATIVES.

Nervines and Sedatives, as a class, do not have a large sale as proprietary medicines, which is rather strange, considering the prevalence of nervous diseases. It is to be inferred that persons thus afflicted either apply to their physician, or purchase some nervine of their druggist with which they have become familiar.

It would seem from these conditions that there is a good opening for a proprietary nervine, which druggists may themselves prepare and put before their patrons.

Many formulas for such preparations are given throughout this work, but the following are calculated, particularly, to put up as proprietary. Only a few of the many compounds known are given, but others may be prepared in the same general manner.

Nervine Tonic.

Skullcap, in coarse powder,	8 ounces av.
Hops, in coarse powder,	8 ounces av.
Hyoscyamus, in coarse powder,	8 ounces av.
Valerian, in coarse powder,	8 ounces av.
Ammonium Bromide,	4 ounces av.
Ether, (Sulphuric),	4 fl.ounces
Alcohol,	3 pints
Sugar,	2 pounds
Water, sufficient to make	1 gallon

Mix the powders and, having mixed the alcohol with 3 pints of water, pour upon them 2 pints of the liquid and macerate for 24 hours in a warm place; then transfer to a water-bath percolator, pack firmly, pour upon it the remaining alcohol and water, and set in a warm place for 1 day; then heat very moderately, and after 1 hour begin to percolate, adding water to the drugs when the liquid has disappeared from the surface, and continuing the heat and percolation until 7 pints have passed; to this add the ether and dissolve in the liquid by agitation the ammonium bromide and sugar. This is an excellent tonic nervine for general nervous depression and irritation, nervous headache, neuralgia, insomnia, epilepsy etc.

The dose is from a teaspoonful to a tablespoonful, as required.

Nervine Elixir.

Ammonium Bromide,	1 $\frac{1}{4}$ ounces av.
Ammonium Valerianate,	$\frac{1}{4}$ ounce av.
Fluidextract of Valerian,	1 fl.ounce
Fluidextract of Hyoscyamus,	1 fl.ounce
Fluidextract of Coca,	1 fl.ounce
Syrup,	2 fl.ounces
Elixir Simple, to make	1 pint

Mix the liquids and dissolve the salts in the mixture; after standing 24 hours, filter. This is an excellent nervine and anodyne elixir for nervousness, pain, neuralgia, hysteria, and all 'nervous troubles.'

Dose from a teaspoonful to a tablespoonful, as required.

Nervurina.

Coca,	8	ounces
Gentian,	8	ounces
Damiana,	8	ounces
Potassium Bromide,	13¼	ounces
Sodium Salicylate,	1	ounce
Dandelion Root,	8	ounces
Alcohol,	2	pints
Glycerin,	1	pint
Water, sufficient to make	1	gallon

Grind the vegetable drugs to about No. 40 powder, add the alcohol and glycerin with an equal measure of water; macerate 24 hours, then percolate, adding enough water and alcohol in the proportions given to make 1 gallon.

Sedative Nervine Elixir.

Potassium Bromide,	640	grains
Ammonium Valerianate,	256	grains
Fluidextract Valerian,	1	fl.ounce
Ammonia Water,	1	fl.drachm
Fluidextract Hops,	½	fl.ounce
Syrup,	2	fl.ounces
Elixir Simple, enough to make	1	pint

Dissolve the salts in the elixir and syrup, add the fluidextracts and the ammonia water, let stand a day of two and filter.

Dose a teaspoonful to a dessertspoonful.

Celery Compound.

Several preparations of celery compounded with other nervines have had a good sale as proprietary medicines, under various titles, as "Celerina," Celery Cordial, Celery Compound etc.

The following formula will make a very satisfactory preparation:

Celery Seed,	1	ounce av.
Coca Leaves,	1	ounce av.
Black Haw Bark,	1	ounce av.
Hyoscyamus Leaves,	½	ounce av.
Orange Peel,	2	drachms
Sugar,	4	ounces av.
Alcohol,	6	fl.ounces
Water, q. s. to make	1	pint

Grind the drugs to a coarse powder, mix the alcohol with 6 ounces of water, pour upon the drugs enough of the diluted alcohol to cover

and macerate for 24 hours; then heat moderately and percolate, adding water through the percolator until 14 fl.ounces are obtained; in this dissolve the sugar and filter. The dose is a teaspoonful to a dessert-spoonful or more, as a nerve tonic.

Celerina.

Fluidextract Celery Seed,	1 fl.ounce
Fluidextract Coca Leaves,	1 fl.ounce
Fluidextract of Kola Nut,	1 fl.ounce
Fluidextract of Black Haw,	1 fl.ounce
Elixir, enough to make	16 fl.ounces

Mix. Dose a teaspoonful to a dessertspoonful.

Chloral-Bromide Compound. "Bromidia."

Under the title "Bromidia," which is claimed as a trade-mark, Battle & Co., Chemists Corporation, of St. Louis, Mo., have prepared and extensively sold a preparation intended to be used as a nervine, sedative and hypnotic. The following formula is based upon the quantitative composition of the preparation as published by them, but druggists are warned by them not to sell nor dispense any preparation other than their own as "Bromidia."

Potassium Bromide,	4 ounces av.
Hydrated Chloral, crystallized,	4 ounces av.
Extract Cannabis Indica,	16 grains
Extract Hyoscyamus,	16 grains
Water, sufficient to make	1 pint

Dissolve the extracts in 4 ounces of boiling water, rub the solution with 1 drachm of magnesium carbonate and filter. Dissolve the potassium bromide in 8 ounces of boiling water and add the hydrated chloral, mix the solutions and add water enough to make 1 pint. This may be colored as desired with a few grains extract of liquorice.

Dose 15 to 30 drops.

Liquor Bromo-Chloral Compositus.

Compound Solution of Bromo-Chloral.

Under this title the B. P. C. Form., 1901, gives the following, which is intended to be like "Bromidia."

Chloral Hydrate,	1600 grains
Tincture of Indian Hemp,	400 minims
Tincture of Fresh Orange Peel,	400 minims
Juice of Henbane,	1600 minims
Syrup,	3¾ fl.ounces
Liquid Extract of Liquorice,	1½ fl.ounce

Dissolve, and take of

Potassium Bromide, 1600 grains

Distilled Water, a sufficient quantity.

Dissolve the potassium bromide in 7 fl.ounces of distilled water, and add to the former solution; filter, and wash the filter with sufficient distilled water to produce 20 fl.ounces. Dose $\frac{1}{2}$ to 2 fl.drachms.

Bromides Compound.

A number of preparations of bromides are sold as proprietary, as "Peacock's Bromides," and by other titles. The following formula makes a preparation similar to those found in the market:

Potassium Bromide,	640 grains
Sodium Bromide,	640 grains
Ammonium Bromide,	384 grains
Calcium Bromide,	192 grains
Lithium Bromide,	64 grains
Water,	8 fl.ounces
Extract of Vanilla,	1 fl.ounce
Sugar,	10 ounces av.

Rub the bromides to a coarse powder. Mix the water and extract of vanilla and dissolve the salts in the mixture; filter and dissolve the sugar in the filtrate by agitation. Dose 1 to 2 fl.drachms in water.

Chlorodyne.

Chloroform,	1 fl.ounce
Fluidextract Cannabis Indica,	1 fl.ounce
Spirit of Ether,	$1\frac{1}{2}$ fl.ounces
Tincture Opium, deodorized,	$1\frac{1}{2}$ fl.ounces
Hydrocyanic Acid, (U. S. P.),	3 fl.drachms
Oleoresin of Capsicum,	3 minims

Dissolve the oleoresin in the chloroform, add the spirit of ether; mix.

Chlorodyne.

Chloroform,	4 fl.drachms
Sulphuric Ether,	2 fl.drachms
Hydrocyanic Acid,	4 fl.drachms
Mucilage Acacia,	1 fl.ounce
Tincture Capsicum,	4 fl.drachms
Morphine Sulphate,	20 grains
Oil of Peppermint,	8 minims
Treacle, (Molasses),	4 fl.ounces

Mix the chloroform with the mucilage acacia, add the oil of peppermint and syrup and shake them well together. Dissolve the morphine sulphate in the tincture of capsicum, and add to the mixture, and lastly add the hydrocyanic acid and mix. This is quite similar to the popular English Brown's Chlorodyne. It must be shaken before taking. The dose is 10 to 20 minims.

Chlorodynia.

Morphine Sulphate,	15 grains
Alcohol,	1 fl.ounce

Chloroform,	1 fl.ounce
Fluidextract Cannabis Indica,	1 fl.ounce
Glycerin,	1 fl.ounce
Hydrocyanic Acid,	15 minims
Peppermint Essence,	15 minims

Mix the liquids and dissolve the morphine salt in the mixture. This is one of the best forms of chlorodyne, as it makes a clear preparation, not required to be shaken when taken. Dose 10 to 30 minims.

OBESITY REMEDIES.

A number of preparations known as obesity remedies, and anti-fat have been considerably sold as proprietary medicines. The most reliable are:

Tincture Adonis Æstivalis. This is a tincture prepared from the green plant and is highly recommended by Merck & Co.

Fluidextract Fucus Vesiculosus. (Bladder Wrack). This is exploited as a remedy for obesity and several proprietary medicines are said to consist chiefly of this drug. Dose $\frac{1}{4}$ to 1 teaspoonful. A solid extract of this drug is also used in the form of pills or tablets. Dose 5 to 30 grains.

Fluidextract Phytolacca. (Poke Root). The continued use of phytolacca in some form is recommended as an anti-fat. The fluidextract, dose 5 to 10 minims; the solid extract, dose 1 to 5 grains, in pills or tablets; and the concentrate phytolaccin, may be used.

OILS. Medicated Oils.

Besides the oils which are noticed in other departments of this Formulary, there are some particularly known in the market as "Oils;" formulas for a few that are not otherwise classified are given here.

Arnicated Oil.

Fluidextract of Arnica,	2 ounces
Camphor,	1 ounce
Oil of Hemlock,	1 ounce
Oil of Sassafras,	1 ounce
Cotton Seed Oil or other bland oil,	32 ounces

Heat the cotton seed oil and fluidextract of arnica together for 2 hours, then cool and add the other oils and dissolve the camphor, previously shaved fine, in the mixture.

This is an excellent application for sores, swellings and irritated surfaces.

Iodized Cod Liver Oil.

Iodine,	16 grains
Cod Liver Oil,	16 fl.ounces

Add the iodine to the cod liver oil contained in a closely stopped bottle, and heat by means of a water-bath until the iodine is dissolved.

A dessertspoonful, the usual dose, contains $\frac{1}{4}$ grain iodine.

Iodo-Ferrated Cod Liver Oil.

Tasteless Iodide of Iron,	64 grains
Cod Liver Oil,	16 fl.ounces

Rub the tasteless iron iodide to a fine powder and then with the cod liver oil gradually added, until the salt is dissolved as much as it will, then allow to settle and decant the clear portion. Dose a dessertspoonful.

Omega Oil.

A proprietary oil by this title has been extensively advertised and sold during the past few years. A preparation quite similar may be made as follows:

Green Extract of Belladonna, (Br.),	$\frac{1}{2}$ ounce av.
Oil of Wintergreen,	1 fl.ounce
Oil of Eucalyptus,	$\frac{1}{2}$ fl.ounce
Chloroform,	1 ounce av.
Paraffin Oil, or Mineral Glycerin,	14 fl.ounces

This may also be prepared by macerating fresh, bruised leaves and young branches of belladonna 1 pound, with paraffin oil 2 pounds, chloroform 2 ounces av., and then pouring off and adding eucalyptus oil 1 ounce, wintergreen oil 2 ounces.

Phosphorol. Phosphorized Cod Liver Oil.

Phosphorus,	1 grain
Cod Liver Oil,	24 fl.ounces

Shave the phosphorus fine and having mixed it with 4 fl.ounces of the oil, stop tightly in a bottle and heat by water-bath until the phosphorus is melted, shake well until the phosphorus is all dissolved, then add the remainder of the oil and mix them well together.

A dessertspoonful, the usual dose, contains $\frac{1}{100}$ grain of phosphorus.

St. Jacob's Oil.

The following has been published as the true formula for St. Jacob's Oil:

Oil of Turpentine,	6 fl.drachms
Camphor,	4 drachms
Chloroform,	6 fl.drachms
Ether,	2 fl.drachms
Tincture Opium,	3 fl.drachms
Oil Origanum,	2 fl.drachms
Oil Sassafras,	2 fl.drachms

Chloral Hydrate,	3 fl.drachms
Alcohol,	32 fl.ounces
Red Saunders, q. s. to color.	
Mix, let stand 24 hours, and filter.	

Vitalized Oil.

Essential Oil of Mustard,	1 drachm
Oil of Peppermint,	1 ounce
Oil of Sassafras,	1 ounce
Oil of Eucalyptus,	1 ounce
Camphor,	1 ounce
Liquid Petrolatum, or other oil base,	32 ounces
Mix the oils and dissolve the camphor in the mixture.	

The liquid petrolatum is now official, but is generally known in the market by other names; any bland neutral oil will do as a base. Camphor oil is cheap and good; olive oil, expressed oil of mustard, cotton seed oil or linseed oil will do. This is a quick, stimulating application acting as a prompt counter-irritant, excellent for neuralgia, rheumatism, pain, cramps etc.

Witch Hazel Oil.

This is prepared by macerating fresh witch hazel twigs, cut in October, in olive oil or cotton seed oil. The twigs should be cut fine and bruised or crushed in a mortar or otherwise, and 1 pound taken for each pint of oil. The oil and twigs are heated together to about 150°F. for several days, and the oil is then poured off, allowed to settle, or filtered.

OINTMENTS AND SALVES.

The sales of proprietary ointments and salves are perhaps as frequent as of almost any class of proprietary medicines; and, although but few sell for more than twenty-five cents, the aggregate of sales is large. A great variety of these remedies are on the market; but, with the exception of a very few, the public are not particular as to the preparation they have, provided, only, it is good for the purpose. Drug-gists can, therefore, put up their own ointments and salves from reliable formulæ, and if the preparation is good and the packages attractive, can secure most of the sales of such articles for their own preparations.

Many formulas are given under other headings. The following are representatives of other popular ointments:

Camphor Ice.

Paraffin,	8 ounces av.
White Petrolatum,	24 ounces av.
Camphor,	6 ounces av.

Oil of Neroli,	5 minims
Oil of Bitter Almonds,	20 minims
Oil of Cloves,	10 minims

Melt the paraffin and petrolatum together, reduce the camphor to a coarse powder and dissolve it in the melted mixture, keeping at as low a temperature as it can be without solidifying. When all is dissolved strain while it is still fluid, add the perfuming oils and run into moulds.

Carbolic Salve or Ointment.

Carbolic Acid, (crystals),	1 ounce av.
Yellow Wax,	2 ounces av.
Petrolatum,	17 ounces av.

Melt the wax and petrolatum together and, while cooling, add the carbolic acid and mix them well together. This is a simple carbolic ointment or salve, useful for all purposes. Other medicinal agents are frequently added, as Canada balsam, or white pine turpentine, say 1 ounce, to make it more stimulating for old sores etc., but the plain carbolic salve as above prepared meets the general requirement. This is a very popular preparation, and has only to be put up attractively to sell.

Carbolated Arnica Salve.

Extract of Arnica,	1 ounce
Carbolic Salve, as above,	15 ounces

Rub the arnica extract with a little alcohol in a warm mortar to soften it uniformly, add the carbolic salve gradually, rubbing them together until uniformly mixed. Other combinations with other extracts may be made in a similar manner.

Golden Ointment.

Oil of Sassafras,	2 fl.drachms
Oil of Origanum,	2 fl.drachms
Balsam of Fir,	$\frac{1}{2}$ fl.ounce
Yellow Wax,	1 ounce av.
Citrine Ointment,	4 ounces av.
Petrolatum,	10 ounces av.

Melt the solid ingredients together and, when cooling, add the oils and balsams, mixing them well together.

Healing Ointment.

White Pine Turpentine,	1 ounce av.
Oil of Rosemary,	2 fl.drachms
Oil of Sassafras,	2 fl.drachms
Yellow Wax,	1 ounce av.
Petrolatum,	16 ounces av.

Melt the solid ingredients together and, while cooling, add the oils.

Itch Ointment.

Lac Sulphur,	2 ounces av.
Naphthalene,	60 grains
Oil Bergamot,	20 minims
Petrolatum,	6 ounces

Rub the lac sulphur to fine powder and sift it into the melted petrolatum, stirring them well together, and when nearly cool add the naphthalene and oil of bergamot, stirring them well together until cold. The same may be made without naphthalene if desired.

Barber's Itch Ointment.

Ammoniated Mercury, (White Precipitate),	45 grains
Naphthalene,	60 grains
Petrolatum,	1 ounce

Melt the petrolatum and naphthalene together and, having rubbed the ammoniated mercury in a mortar to a very fine powder, add the melted ingredients and incorporate them thoroughly.

Magnetic Ointment.

Belladonna Leaves,	$\frac{1}{2}$ ounce
Fine Cut Tobacco,	2 ounces
Lard,	1 pound
Yellow Beeswax	2 ounces

Melt the lard and beeswax together and steep the drugs in the melted fat for 6 hours, then strain.

Pile Ointment.

Powdered Nutgalls,	1 ounce av.
Powdered Opium,	1 drachm
Powdered Myrrh,	2 drachms
Goulard's Extract,	4 fl.drachms
Yellow Wax,	2 ounces
Petrolatum,	16 ounces

Melt the wax and petrolatum and while cooling, add the other ingredients, with constant stirring, until cold.

Ringworm Ointment.

Naphthalene,	60 grains
Tannin,	30 grains
Verdigris,	15 grains
Petrolatum,	1 ounce

Melt the petrolatum with the naphthalene and, while cooling, incorporate the tannin and verdigris by rubbing in a mortar.

Salt Rheum Ointment.

Oil of Sassafras,	2 fl.drachms
Oil of Hemlock,	1 fl.drachm

Oil of Rosemary,	1 fl.drachm
Pine Tar,	1/2 ounce av.
Salicylic Acid,	2 drachms
White Pine Turpentine,	1 ounce
Solution Lead Subacetate,	1/2 fl.ounce
Petrolatum,	16 ounces

Melt the solid ingredients together and while cooling incorporate the oils, tar and lead solution, stirring them well together until cold.

Skin Ointment.

This ointment is designed for any kind of skin eruption or "Eczema," as it is popularly termed. For parasitic diseases, however, the Itch, or Tetter Ointment will be more efficacious.

Tincture of Benzoin Compound,	2 fl.drachms
Juniper Tar,	1 fl.ounce
Salicylic Acid,	2 drachms
Rosin,	1 ounce av.
Oil of Rosemary,	2 fl.drachms
Carbolic Acid,	1 drachm
Petrolatum,	16 ounces av.

Melt the solid ingredients and while cooling add the liquids.

Tetter Ointment.

Lead Carbonate,	1 ounce av.
Alum, in fine powder,	1 ounce av.
Calomel,	1 ounce av.
White Pine Turpentine,	1 ounce av.
Salicylic Acid,	2 drachms
Petrolatum,	12 ounces av.

Melt the petrolatum and turpentine together and, while cooling, add the other ingredients, previously mixed, and stir them together constantly until cool.

Thymol Ointment.

Thymol,	1 ounce av.
Yellow Wax,	2 ounces av.
Petrolatum,	16 ounces av.

Melt the wax and petrolatum together, and while cooling, add the thymol, stirring them well together.

Veterinary Ointment.

Citrine Ointment,	2 ounces av.
Oil Sassafras,	1/2 fl.ounce
Rosin,	1 ounce av.
Petrolatum, dark,	16 ounces av.

Melt the petrolatum and rosin together and, while cooling, add the citrine ointment and oil of sassafras.

Witch Hazel Ointment.

Witch Hazel Twigs, freshly gathered,	1 pound
Yellow Wax,	2 ounces
Petrolatum or Lard,	2 pounds

Cut the twigs into small pieces and bruise them in a mortar, then, having melted the petrolatum and wax together, add the twigs and allow them to simmer for 4 hours, with gentle heat. Then strain the melted ointment from the twigs.

Bittersweet Ointment may be made in the same manner from the fresh bark of *Celastrus Scandens*.

Ointments of this kind may also be made by adding fluidextracts of the vegetable drugs to the melted base, and heating them together until the alcohol and water of the extract have evaporated, then stirring them, when nearly cool enough to set, until cold.

PECTORALS.

Pectorals might very properly be classed under cough remedies, but as there are a few preparations known more particularly as pectorals, they are included under this heading.

Cherry Pectoral.

Morphine Acetate,	6 grains
Tincture of Sanguinaria,	4 fl.drachms
Wine of Ipecac,	6 fl.drachms
Wine of Antimony,	6 fl.drachms
Fluidextract of Wild Cherry,	2 fl.ounces
Oil of Bitter Almonds,	5 drops
Hydrocyanic Acid, U. S. P.,	1 fl.drachm
Glycerin,	8 fl.ounces
Water, sufficient to make	1 pint

Mix, and after standing a few days, filter.

This preparation is quite similar to Ayer's. The dose is 15 drops to 1 teaspoonful. It may be colored as desired.

Pectoral Drops. Bateman's.

Tincture of Opium, Camphorated,	10 fl.ounces
Tincture of Castor,	4 fl.ounces
Tincture of Opium,	1 fl.ounce
Tincture of Cochineal,	1/2 fl.ounce
Oil of Anise,	15 drops

Mix them. This is supposed to be the original formula. The Philadelphia College of Pharmacy gives the following formula as a substitute: Camphor, catechu, powdered opium and red Saunders wood, each, 2 ounces av.; oil of anise 4 fl.drachms, proof spirit 4 gallons. Digest 10 days and filter.

Pectoral or Cough Pills.

Ipecac, in powder,	100 grains
Squill, in powder,	50 grains
Morphine Sulphate,	3 grains
Tartar Emetic,	6 grains
Extract Hyoscyamus,	100 grains
Make 100 pills. The dose is one or two pills.	

Pectoral Tea or Hamburg Tea.

Althæa Root, cut,	4 ounces
Liquorice Root, cut,	1 ounce
Mullein Leaves, cut,	4 ounces
Senna Leaves, cut,	1 ounce
American Saffron,	$\frac{1}{4}$ ounce
Malva Flowers, cut,	3 ounces
Blue Flowers, (Asters or Bachelor Button),	$\frac{1}{4}$ ounce
Fennel Seed, bruised,	$\frac{1}{2}$ ounce
Anise Seed, bruised,	$\frac{1}{2}$ ounce
Granulated Sugar,	$\frac{1}{2}$ ounce

Mix them thoroughly. This is usually put up in packages of about 2 ounces, a tablespoonful being steeped in two or three cups of boiling water, and the infusion drunk freely for influenza and colds.

PURGATIVE PREPARATIONS.

Most purgative preparations are in the form of pills or mixtures and are quite generally known as Cathartics or Laxatives. A few preparations, however, are known as purgatives or by some similar name expressing their action. Most of these have phenolphthalein as their active ingredient; this is known as Purgen or Purgene, and is compounded in various forms.

Purgamenta. A liquid purgative consisting of an alcoholic solution of phenolphthalein mixed with glycerin or honey. A similar preparation may be made with phenolphthalein 128 grains, alcohol 4 fl.ounces, glycerin 4 fl.ounces, water 8 fl.ounces. Dissolve the phenolphthalein in the alcohol, and add the glycerin and water. Dose teaspoonful to a tablespoonful.

Purgen. This is phenolphthalein put up in the form of tablets; for adults $1\frac{1}{2}$ to $7\frac{1}{2}$ grains, for children $\frac{1}{8}$ to 1 grain.

Purglets. These are laxative tablets containing $1\frac{1}{2}$ grains of phenolphthalein, recommended as a laxative.

Many other purgative preparations will be found under other headings in this work.

RHEUMATIC REMEDIES.

Proprietary remedies for rheumatism, which are to be taken, are quite salable preparations, and the market is not so overstocked with them as with some other remedies. The following formulæ are representative of the various kinds:

Rheumatic Remedy.

Sodium Salicylate,	4 ounces av.
Potassium Iodide,	2 ounces av.
Potassium Nitrate,	3 ounces av.
Fluidextract of Black Cohosh,	4 fl.ounces
Fluidextract of Colchicum,	4 fl.ounces
Oil of Wintergreen,	1 fl.drachm
Sugar,	16 ounces av.
Water,	5 pints
Alcohol,	2 pints

Mix the oil of wintergreen and the fluidextracts with the alcohol. Dissolve the salts and sugar in the water, mix the solution and allow to stand over night, then filter clear. This is an excellent remedy, the dose is from 1 to 2 teaspoonfuls.

Favorite Rheumatic Remedy.

Potassium Iodide,	1 ounce av.
Fluidextract of Colchicum,	1 fl.ounce
Spirit of Nitre,	3 fl.ounces
Syrup of Sarsaparilla, compound,	1 pint
Gin or Whisky,	12 fl.ounces

Formulas similar to this preparation are popular, and very good results are usually obtained from their use. The dose is a teaspoonful to a dessertspoonful.

Freleigh's Rheumatic Remedy.

The following contains the ingredients claimed to be in Freleigh's Rheumatic Remedy. Fluidextracts may be used instead of the drugs, if desired, making up the required measure with diluted alcohol.

Hyoscyamus Leaves,	$\frac{3}{8}$ ounce av.
Colchicum Seeds,	$\frac{2}{3}$ ounce av.
Belladonna Leaves,	$\frac{1}{8}$ ounce av.
Aconite Leaves,	$\frac{1}{4}$ ounce av.
Apocynum Cannabinum, (Black Indian Hemp),	$\frac{3}{4}$ ounce av.
Bryonia,	$\frac{1}{4}$ ounce av.
German Chamomile,	$\frac{3}{4}$ ounce av.
Tincture Rhus Toxicodendron, (green leaves),	$\frac{1}{2}$ ounce av.
Alcohol, 3 parts by measure, and water, 1 part by measure, to make	1 pint

Percolate the powdered drugs with the alcohol and water until 1 pint is obtained, and add the green tincture of rhus.

The dose is from 20 to 30 minims.

Lallemand's Gout Mixture.

Acetic Extract Colchicum, Br. P.,	30 grains
Aqueous Extract Opium,	30 grains
Potassium Iodide,	1 ounce
Potassium Acetate,	4 drachms
Distilled Water,	5 ounces
White Wine,	1 ounce

Rub the extracts with the water until dissolved, add the salts and then the wine. Dose 20 to 30 drops, three times a day.

This is also known as Lallemand's Gout Specific under which name it has had a great reputation as a remedy for gout.

Lithiated Hydrangea.

Lithium Carbonate,	120 grains
Lithium Benzoate,	660 grains
Fluidextract Hydrangea Arborescens,	1½ fl.ounces
Alcohol,	2 fl.ounces
Water,	13 fl.ounces

Mix and dissolve.

A similar but stronger preparation is known as "Seven Barks."

In the "Seven Barks" preparation an acetic fluidextract of hydrangea is used.

Salicylica Rheumatic Remedy.

Salicylic Acid,	8 ounces av.
Sodium Bicarbonate,	5½ ounces av.
Potassium Nitrate,	3 ounces av.
Tincture of Colchicum Seed,	8 fl.ounces
Oil of Wintergreen,	2 fl.drachms
Syrup,	2 pints
Alcohol,	1 pint
Water, sufficient to make	1 gallon

Mix the salicylic acid with 2 pints of water in a gallon bottle and gradually add the sodium bicarbonate in small portions, at intervals of a few moments, giving time for the effervescence to subside before adding more. When all has been dissolved (which will require about 2 hours) add the alcohol in which the wintergreen oil has been dissolved, and then add the tincture and syrup, and lastly the potassium nitrate and sufficient water to make a gallon; after standing, filter. Dose a dessertspoonful.

Salol Rheumatic Remedy.

Salol,	128 grains
Potassium Iodide,	256 grains
Potassium Bicarbonate,	128 grains
Elixir,	1 pint

Mix and dissolve. Dose a dessertspoonful.

Rheumatic Elixir.

Potassium Iodide,	1 ounce av.
Sodium Salicylate,	1 ounce av.
Wine of Colchicum Seed,	2 ounces av.
Elixir, sufficient to make	1 pint

Mix and dissolve. Dose from a dessertspoonful to a tablespoonful.

Rheumatic Cure.

Potassium Acetate,	2½ ounces av.
Wine of Colchicum,	2 fl.ounces
Elixir, sufficient to make	1 pint

Mix and dissolve. Dose from a teaspoonful to a tablespoonful.

Rheumatic Bitters — Powder.

Colchicum Root, in fine powder,	4 ounces
Black Cohosh Root, in fine powder,	4 ounces
Prickly-Ash Bark, in fine powder,	½ ounce
Cinnamon Bark, in fine powder,	½ ounce
Potassium Iodide, in fine powder,	1 ounce
Potassium Nitrate, in fine powder,	1 ounce

Mix thoroughly and put up in packages or boxes of about 1 ounce.

The contents of the package are to be added to a quart of gin.

Rheumatic Remedy — Tea.

Black Cohosh Root, cut fine,	6 ounces
Colchicum Root, cut fine,	4 ounces
Sassafras Bark, cut fine,	2 ounces
Juniper Berries, crushed,	1 ounce
Potassium Nitrate, in powder,	2 ounces

Mix thoroughly and put up in packages of about 2 ounces, which is sufficient for a quart of liquid medicine. It may be added to a quart of gin or diluted alcohol.

SALTS.

A few preparations in the form of salts have a good sale as proprietary medicines. The following are representatives of those found in the market, others will be found under other headings.

Seltzer Aperient.

Magnesium Sulphate, dried,	2 ounces
Rochelle Salt, dry,	2 ounces
Tartaric Acid, dry,	6 ounces
Sodium Bicarbonate,	6½ ounces

Mix them thoroughly and put up in dry bottles.

It is necessary that the magnesium sulphate (Epsom salts) should be thoroughly dried by heating on a sand-bath in a porcelain vessel for a considerable time until it has lost its water of crystallization.

The dose is a teaspoonful or two in part of a glass of water.

Fruit or Grape Salt.

Several preparations under various titles, as Fruit Salt, Grape Salts, Fruit Saline, Sal Muscatel etc., are put up as laxatives and restoratives. The following formula will suffice for all:

Sodium Bicarbonate,	6 ounces
Tartaric Acid,	2 ounces
Cream of Tartar,	10 ounces
Rochelle Salt,	4 ounces
Sugar,	1 ounce
Oil of Lemon,	30 minims
Oil of Orange,	20 minims
Oil of Limes,	20 minims

Mix the oils with a small portion of the Rochelle salt, and then with the remainder and incorporate this thoroughly, first with the cream of tartar, and then with the sodium bicarbonate and put up in dry bottles.

Crab-Orchard Salt.

Magnesium Sulphate,	2 ounces
Sodium Sulphate,	2 ounces
Cream of Tartar,	2 ounces
Tartaric Acid,	2 ounces
Sodium Carbonate,	2 ounces
Sugar,	4 ounces

Dry the salts and mix the well together and put up in dry bottles.

Carlsbad Salts, Artificial.

Sodium Chloride,	1 ounce
Sodium Bicarbonate,	3 ounces
Sodium Sulphate, dried,	10 ounces

Mix them thoroughly and put up in dry bottles.

The sodium sulphate must be dried by heating on a sand-bath until its water of crystallization has evaporated and it is reduced to a dry powder.

This may also be prepared by dissolving the salts altogether in water and evaporating to a granular salt.

This is given as a laxative in doses of a teaspoonful in part of a glass of water.

Kutnow's Powder is similar to this, the supposed formula being; Potassium sulphate 1 part, sodium chloride 9 parts, sodium bicarbonate 18 parts, sodium sulphate, dried, 22 parts.

Hepatic Salt.

A proprietary preparation by the name of "Sal Hepatica" has had considerable sale as a liver remedy, laxative and uric acid solvent. The following formula will make a satisfactory preparation for this purpose, but should not be put up or sold under the same proprietary name,

Exsiccated Sodium Phosphate, U. S.,	6 ounces
Sodium Bicarbonate, dry,	4 ounces
Tartaric Acid, dry,	3 ounces
Rochelle Salt, dry,	2 ounces
Sodium Chloride, dry,	2 ounces

Mix the dry salts thoroughly and put into dry bottles, well protected from moisture. Dose $\frac{1}{2}$ to 1 teaspoonful or more of the salt dissolved in $\frac{1}{3}$ glass of cold water.

SARSAPARILLA COMPOUNDS.

Of all proprietary medicines the Sarsaparilla Compounds have the largest sale. They are put up under various names and titles, as alteratives, blood purifiers, blood cleansers, medical discoveries, re-solvents etc., but are best known and most frequently sold under the name of "Sarsaparilla," although this is considered medicinally the least valuable of the drugs composing the preparation. In the preceding pages many good formulas for sarsaparilla preparations suitable for putting up will be found under other headings.

The following are also given as representatives of preparations of this kind found on the market as proprietary medicines:

Sarsaparilla Compound.

With Iodide of Potassium.

This is one of the best and most common sarsaparilla preparations.

Sarsaparilla, in No. 30 powder,	8 ounces av.
Stillingia, in No. 40 powder,	8 ounces av.
Burdock Root, in No. 30 powder,	3 ounces av.
Blue Flag Root, in No. 20 powder,	1½ ounces av.
Mandrake Root, in No. 50 powder,	1½ ounces av.
Senna Leaves, in No. 20 powder,	1½ ounces av.
Prickly-Ash Bark, in No. 50 powder,	¾ ounce av.

Potassium Iodide,	1 ounce av.
Sarsaparilla Flavoring,	1 fl.ounce
Diluted Alcohol,	4 pints
Sugar,	5 pounds
Water, sufficient to make	1 gallon

Mix the drugs, moisten them with 2 pints of diluted alcohol and macerate for 24 hours; transfer to the water-bath percolator, pack moderately, pour upon them 2 pints of diluted alcohol and set in a warm place for 24 hours; then heat moderately and, after 1 hour begin to percolate, adding water to the drugs after the liquid has ceased to drop and continuing the heat and percolation until 5 pints are obtained. To this add the sarsaparilla flavoring and potassium iodide and, after standing 24 hours, filter; adding through the filter enough water to make 5 pints. In this dissolve the sugar and add enough water to make 1 gallon. A larger quantity of potassium iodide may be added if desired.

Concentrated Extract of Sarsaparilla Compound.

This formula makes a preparation similar to the stronger sarsaparilla compounds that are found on the market, like Ayer's and other similar preparations.

Fluidextract Sarsaparilla, Honduras,	4 fl.ounces
Fluidextract Yellow Dock,	4 fl.ounces
Fluidextract Stillingia,	3 fl.drachms
Fluidextract Mandrake,	2 fl.drachms
Potassium Iodide,	100 grains
Iron Iodide,	10 grains
Glycerin,	4 fl.ounces
Water, sufficient to make	1 pint

Mix, dissolve and filter. The dose is from half to a teaspoonful. The weaker sarsaparilla compounds may be made from this by diluting it with 3 parts, by measure, of syrup.

Sarsaparilla, Stillingia and Red Clover Extract.

Sarsaparilla,	8 ounces av.
Stillingia,	8 ounces av.
Red Clover Tops,	8 ounces av.
Mezereum Bark,	1 ounce av.
Sassafras Bark,	1 ounce av.
Potassium Iodide,	1 ounce av.
Sarsaparilla Flavoring,	1 fl.ounce
Diluted Alcohol,	6 pints
Sugar,	4 pounds
Water, sufficient to make	1 gallon

Make as directed in the preceding formula. Dose a teaspoonful to a dessertspoonful.

Syrup Red Clover Compound — Dr. Rush's Formula.

Red Clover,	8 ounces
Stillingia, Burdock Root and Sarsaparilla, each,	4 ounces
Berberis Aquifolia,	2 ounces
Prickly-Ash Berries,	1 ounce
Poke Root,	1 ounce
Potassium Iodide,	2 ounces
Oil of Wintergreen,	30 drops
Alcohol, 33 $\frac{1}{3}$ percent., a sufficiency.	

After 12 hours maceration percolate the powdered drugs to 5 pints. To 6 pounds of sugar add the oil of wintergreen, add the potassium iodide to the percolate, dissolve the sugar by percolation and make up 1 gallon with simple syrup.

Sarsaparilla Resolvent.

A few proprietary preparations found in the market are known as Resolvents. They are mostly compounds of sarsaparilla with a considerable quantity of potassium iodide or potassa alkali, and are known as Cuticura, Resolvent, Ready Resolvent etc. A sample formula will suffice.

Sarsaparilla, Honduras,	8 ounces av.
Stillingia,	8 ounces av.
Burdock Root,	8 ounces av.
Sassafras Bark,	2 ounces av.
Blue Flag Root,	2 ounces av.
Prickly-Ash,	$\frac{1}{2}$ ounce av.
Potassium Iodide,	1 ounce av.
Potassium Bicarbonate,	1 ounce av.
Sarsaparilla Flavoring,	$\frac{1}{2}$ ounce av.
Diluted Alcohol,	6 pints
Sugar,	3 pounds
Water, sufficient to make	1 gallon

Grind the drugs to a coarse powder and percolate by water-bath percolation, first with the diluted alcohol, then with enough water to make 6 $\frac{1}{2}$ pints of the percolate, add the flavoring, the salts and the sugar and, after standing, filter. The dose is a dessertspoonful.

Medical Discovery.

Under this title several alterative and sarsaparilla compounds have been extensively sold as blood purifiers etc. The following will suffice for all:

Sarsaparilla, Mexican,	8 ounces
Yellow Dock Root,	8 ounces
Blue Flag Root,	4 ounces
Yellow Parilla,	2 ounces

Leptandra Root,	1 ounce
Sarsaparilla Flavoring,	½ ounce
Potassium Iodide,	2 ounces
Sugar,	4 pounds
Diluted Alcohol,	6 pints
Water, sufficient to make	1 gallon

Grind the drugs to a coarse powder and percolate by water-bath percolation, first with the diluted alcohol and then with water until 6 pints are obtained, then add the sarsaparilla flavoring and potassium iodide and filter, afterwards dissolving the sugar in the filtrate, and making up the measure with water to 1 gallon.

Mercury iodide ½ ounce may be used instead of potassium iodide.

SOOTHING AND TEETHING SYRUPS.

The sale for proprietary soothing syrups and like preparations is quite extensive and there are but comparatively few makes on the market. The following formulæ make preparations similar to those in use and others quite different from any to be found.

Baby-Soother or Soothing Syrup.

Tincture of Hyoscyamus,	8 fl.ounces
Fluidextract of Senna,	2 fl.ounces
Oil of Anise,	3 fl.drachms
Chloroform,	30 minims
Alcohol,	10 fl.ounces
Water,	4 pints
Sugar,	6 pounds

Dissolve the oil of anise and chloroform in the alcohol, and mix with the tincture and fluidextract, add the water, filter clear and dissolve the sugar in the filtrate by agitation. This as a quieting, slightly laxative syrup, and contains nothing injurious to children. It may be further improved by adding to it 1 pint of syrup lime lacto-phosphate, which supplies to the blood the required nutrition during the critical period of dentition.

From ¼ to a teaspoonful may be given at a dose.

Malt Soothing Syrup.

Morphine Sulphate,	6 grains
Water,	1 ounce
Compound Syrup of Hypophosphites,	7½ ounces
Liquid Extract of Malt,	7½ ounces

Dissolve the morphine in the water and mix with the extract of malt, then mix the syrup hypophosphites. Dose ½ to 1 teaspoonful.

Nutritive Soothing Syrup.

Morphine Sulphate,	6 grains
Syrup of Lacto-Phosphates Compound,	15 ounces
Water,	1 ounce

Dissolve the morphine in the water and add to the syrup. Dose $\frac{1}{2}$ to 1 teaspoonful. This is an excellent compound for teething babies.

Quieting Syrup.

Lactucarium,	256 grains
Extract of Ginger,	$\frac{1}{2}$ ounce
Essence of Anise,	1 ounce
Sugar,	13 ounces
Hot Water,	8 ounces
Rochelle Salts,	$1\frac{1}{3}$ ounces

Rub the lactucarium with the hot water in a mortar, and add the Rochelle salts, allow to macerate with occasional agitation for 24 hours, then add the ginger and anise to the sugar, and shake thoroughly together, and dissolve in the liquid by agitation. When dissolved, strain. Dose $\frac{1}{2}$ to 1 teaspoonful.

Rhubarb Soothing Syrup.

Rhubarb,	8 ounces
Anise Seed,	3 ounces
Jamaica Ginger,	2 ounces
Poppy Leaves,	4 ounces
Potassium Bicarbonate,	2 ounces
Water, q. s. to make	$4\frac{1}{2}$ pints
Sugar,	7 pounds

Grind the drugs to a coarse powder. Dissolve the sodium bicarbonate in the water and moisten the drugs with it; pack it in a percolator and pour the water upon the drugs; macerate for 2 days and begin the percolation; percolate until $4\frac{1}{2}$ pints are obtained, adding enough water through the percolator to make the quantity. Dissolve the sugar in the percolate by agitation or gentle heat, and strain.

This is a harmless soothing syrup, well suited to neutralize the acid stomach and to correct the bowel difficulties incident to teething.

Soothing Syrup.

Rochelle Salts,	$1\frac{1}{3}$ ounces
Morphine Sulphate,	6 grains
Essence of Jamaica Ginger,	$\frac{1}{2}$ ounce
Essence of Anise (1 part Oil of Anise to 16 parts alcohol),	1 ounce
Sugar,	13 ounces
Water,	8 ounces
Magnesium Carbonate,	1 drachm

Mix the extract ginger and essence anise, and rub them with the magnesium carbonate, in a mortar, to a smooth paste; add the water, a little at a time, and rub thoroughly; filter, and dissolve the morphine first, then the Rochelle salts in the filtrate; when dissolved filter, if necessary, and dissolve the sugar in the liquid by agitation.

Dose $\frac{1}{2}$ to 1 teaspoonful.

Essence of fennel may be used instead of essence of anise in this preparation, and chloroform 1 fl.drachm may be added if desired.

SPECIFICS.

A few proprietary medicines are known as Specifics. The name is applied to medicines of various kinds, for asthma, catarrh, dyspepsia, gout, rheumatism, malaria etc., but is more particularly understood to apply to remedies for syphilis, and these only will be considered under this heading, as they are not given elsewhere except generally under alteratives, sarsaparillas etc.

S. S. Specific.

Fluidextract of Stillingia,	8 fl.ounces
Fluidextract of Blue Flag,	2 fl.ounces
Fluidextract of Prickly-Ash,	1 fl.ounce
Potassium Iodide,	1 ounce av.
Calcium Iodide,	$\frac{1}{2}$ ounce av.
Diluted Alcohol, to make	1 pint

Dissolve the iodides in the diluted alcohol and mix the solution with the fluidextracts. The dose is a teaspoonful to a dessertspoonful.

The following is given by Dr. B. J. A. Cull, of Carnilla, Ga., as the original formula for making S. S. S.:

Old Man's Grey Beard Root, (<i>Chionanthus virginica</i>),	1 bushel
Prickly-Ash Root,	1 pound
Sarsaparilla Root,	10 ounces
Stillingia Root,	1 pound
Copper Sulphate,	100 grains

Boil the roots with 8 gallons of water and cover with pine tops until the decoction acquires the color of ink. Strain, add the copper sulphate and sufficient spirit to prevent fermentation, this is of alcohol 20 percent. Dose a wineglassful four times a day.

Hospital Specific.

Mercury Bichloride,	1 $\frac{1}{2}$ grains
Liquor Arsenic Chloride,	$\frac{1}{2}$ ounce
Tincture Iron Chloride,	1 $\frac{1}{2}$ ounces
Hydrochloric Acid, diluted,	1 ounce
Syrup Ginger,	3 ounces
Distilled Water, sufficient to make	12 ounces

Rub the mercury with 4 ounces of water until dissolved, then add the liquids and sufficient water to make the measure 12 fl.ounces.

Dose a dessertspoonful three times a day. This should not be continued more than two weeks in succession.

Rex Magnus Specific.

Calcium Iodide,	1 ounce av.
Potassium Iodide,	1 ounce av.
Tincture of Iodine,	1 fl.ounce
Essence of Wintergreen,	1 fl.drachm
Alcohol,	4 fl.ounces
Syrup,	4 fl.ounces
Water, sufficient to make	1 pint

Mix and dissolve. The dose is a teaspoonful to a dessertspoonful, which should be taken alternately with the following:

Fluidextract Stillingia,	6 ounces
Fluidextract Sarsaparilla, Honduras,	4 ounces
Fluidextract Yellow Dock,	4 ounces
Fluidextract Prickly-Ash,	1 ounce
Fluidextract Blue Flag,	1 ounce
Fluidextract Mandrake,	4 drachms

Mix them. The dose is a teaspoonful to a dessertspoonful, to be taken alternately with the foregoing.

The latter part of this preparation is entirely unlike the proprietary "Rex Magnus," but it is believed to be much better as an alterative in connection with the solution of iodides etc.

TONICS AND RESTORATIVES.

A great many tonic preparations for various uses are included under other headings in the preceding pages, therefore only a few which are more particularly known as tonics in the market will be given here.

Beef and Coca Tonic. Elixir Beef and Coca.

Liebig's Extract of Beef,	$\frac{1}{2}$ ounce av.
Fluidextract of Coca,	1 fl.ounce
Elixir,	15 fl.ounces

Rub the meat extract with the elixir, add the fluidextract, and after standing, filter.

To make Beef, Coca and Iron Tonic or Elixir, add to the foregoing $\frac{1}{2}$ ounce solution phosphate of iron. If quinine is desired in the preparation, 32 grains may be dissolved in a pint of either the beef and coca, or the beef, coca and iron.

The dose of these preparations is a teaspoonful to a tablespoonful.

Celery Tonic.

Celery tonics have, within the past few years become very popular as proprietary remedies. Without attempting to imitate any special

preparation, the following formula is given, with the assurance that it will produce a satisfactory compound.

Celery Seed,	2 ounces av.
Bitter Orange Bark,	2 ounces av.
Calisaya Bark,	2 ounces av.
Leptandra Root,	1 ounce av.
Cascara Bark,	4 ounces av.
Cinnamon Bark,	1 ounce
Capsicum,	1 drachm
Alcohol,	40 fl.ounces
Sugar,	1 pound
Water, sufficient to make	1 gallon

Grind the drugs to a coarse powder and, having mixed the alcohol with 5 pints of water, moisten the powder with the liquid, pack in a percolator, pour the remaining liquid upon the drug and after standing 24 hours, percolate, adding enough water through the percolator to make the percolate $7\frac{1}{2}$ pints; dissolve the sugar in the percolate and, after standing, filter. Dose a dessertspoonful to a tablespoonful. Acts as a tonic and laxative and a stimulant for the liver and kidneys.

Cinkola Tonic.

Fluidextract Cola,	4 fl.ounces
Fluidextract Cinchona,	4 fl.ounces
Fluidextract Bitter Orange Peel,	2 fl.ounces
Tincture Cardamom Compound,	2 fl.ounces
Tincture Capsicum,	2 fl.drachms
Precipitated Calcium Phosphate,	2 ounces av.
Elixir, sufficient to make	1 gallon

Mix the fluidextracts and tinctures with the calcium phosphate and add 7 pints of elixir; shake thoroughly and, after standing, pour off the liquid portion; pour the sediment at the bottom on a filter and pour the liquid portion upon it to filter, adding enough elixir at last, through the filter, to make 1 gallon. Dose a dessertspoonful to a tablespoonful.

Excelsior Tonic.

Fluidextract Calumba,	4 ounces
Fluidextract Hydrastis,	4 ounces
Fluidextract Leptandra,	1 ounce
Tincture Aloes,	1 ounce
Tincture Cardamom Compound,	1 ounce
Tincture Capsicum,	1 ounce
Tincture Cinchona Compound,	1 ounce
Alcohol,	2 pints
Glycerin,	6 fl.ounces
Water,	5 pints

Mix, and after standing, filter. This is an excellent general tonic especially adapted for enfeebled digestion, loss of appetite, torpid liver, weak circulation, and those suffering from the drink habit. The dose is a teaspoonful to a dessertspoonful every three hours.

Freleigh's Tonic.

A Phosphorized Cerebro-Spinant.

Tincture Ignatia,	1 ounce
Tincture Nux Vomica,	1 ounce
Tincture Cinchona,	4 ounces
Tincture Matricaria,	1 ounce
Tincture Calumba,	$\frac{1}{2}$ ounce
Tincture Gentian Compound,	$\frac{1}{2}$ ounce
Tincture Aromatic,	2 ounces
Phosphorus,	2 grains

The tincture of aromatics may be made as follows:

Oil of Orange, fresh,	30 minims
Oil of Wintergreen,	20 minims
Oil of Cassia,	15 minims
Alcohol,	2 ounces

To make this tincture, dissolve the phosphorus in 2 drachms of hot absolute alcohol, and add to the tinctures, then add the aromatic tincture and filter.

The dose is 5 to 10 drops in 2 tablespoonfuls of water. As a tonic for nervous headache, insomnia, nervous debility etc.

German Tonic.

Tincture of Cinchona,	2 fl.ounces
Tincture of Gentian Compound,	1 fl.ounce
Tincture of Capsicum,	1 fl.drachm
Fluidextract of Golden Seal,	2 fl.drachms
Sugar,	4 ounces av.
Brandy,	6 fl.ounces
Cinnamon Water,	5 fl.ounces

Mix. Dissolve the sugar in the mixture and after standing, filter. This is a general tonic; the formula may be varied if desired. Dose a dessertspoonful to a tablespoonful.

Ginger Tonic.

Jamaica Ginger, in powder,	2 ounces av.
Gentian, in coarse powder,	$\frac{1}{4}$ ounce av.
Cinnamon, in coarse powder,	1 drachm
Bitter Orange Peel, in coarse powder,	$\frac{1}{4}$ ounce
Magnesium Carbonate,	$\frac{1}{4}$ ounce
Sugar,	2 ounces av.

Alcohol,	6 fl.ounces
Diluted Alcohol, a sufficient quantity.	
Water, sufficient to make	1 pint

Macerate the powdered drugs first with the alcohol in a wide-mouth bottle for 5 days, then add 6 fl.ounces of water, and let stand 5 days or more, with daily agitation, then pour off the fluid portion and percolate the drugs with sufficient diluted alcohol to make when added to the poured-off liquid 16 fl.ounces; rub this with the magnesium carbonate in a mortar, filter and dissolve the sugar in the filtrate.

This may also be made by mixing soluble extract of ginger 4 fl.ounces, with tincture gentian compound 2 fl.ounces, aqueous fluid-extract golden seal 2 fl.drachms, sugar 2 ounces, alcohol, water, of each, 5 ounces. Dose a teaspoonful to a dessertspoonful.

Harter's Wild Cherry Bitters.

The following is said to make a similar preparation: Wild cherry bark 8 ounces, yellow cinchona bark 1 ounce, orange peel 2 ounces, cardamom seeds 1 ounce, wild ginger root $\frac{1}{2}$ ounce, diluted alcohol 6 pints, honey 1 pint, syrup 1 pint. Macerate the drugs with the diluted alcohol and percolate, adding enough diluted alcohol through the percolator to produce 6 pints. To this add the syrup and honey and, after standing, filter.

Iron Tonic.

A great variety of iron tonics will be found among the elixirs, bitters, wines etc., but the following general formula is submitted:

Quinine Sulphate,	40 grains
Cinchonidine Sulphate,	80 grains
Strychnine Sulphate,	4 grains
Fluid Hydrastis,	4 fl.ounces
Tincture of Gentian Compound,	8 fl.ounces
Tincture of Iron, tasteless,	4 fl.ounces
Soluble Elixir Flavoring,	4 fl.ounces
Sugar,	2 pounds
Alcohol,	2 pints
Water, sufficient to make	1 gallon

Dissolve the salts in the alcohol, mix the other ingredients with 4 pints of water, and when the sugar is dissolved mix the two solutions, and after standing, filter. This may be colored brown or reddish-brown with caramel and red coloring if desired. The dose is a dessertspoonful or more.

Any of the iron bitters or bitter wines of iron or elixirs of bark and iron may be put up under this title. The proprietors of Brown's Iron Bitters have endeavored to intimidate the retail druggists by claiming a proprietary right to the title "Iron Bitters," or "Iron Tonic," and that no such preparations by similar names could be sold, but this

claim cannot, of course, be maintained, and any druggist may put up an iron bitters or iron tonic.

McLean's Strengthening Cordial.

This preparation is said to be made with:

Gentian,	8 ounces
Columbo,	8 ounces
Orange Peel,	2 ounces
Coriander Seeds,	1 ounce
Cardamom Seeds,	$\frac{1}{2}$ ounce
Serpentaria,	1 ounce

Grind the drugs to a coarse powder and macerate with whisky 7 pints and glycerin 1 pint, for seven days; transfer to a percolator and percolate, adding through the percolator enough water to make 1 gallon.

Peruvian Tonic.

Peruvian Bark,	4 ounces
Bitter Orange Peel,	3 ounces
Canada Snake Root,	1 ounce
Mezereum Bark,	1 ounce
Dandelion Root,	4 ounces
Senna Leaves,	4 ounces
Buchu Leaves,	2 ounces
Alcohol,	3 pints
Water,	6 pints
Sugar,	1 pound

Grind the drugs to a coarse powder and macerate for 24 hours with 1 pint of alcohol and 2 pints of water, transfer to a percolator, pour on the remainder of the water and percolate. Dissolve the sugar in the percolate and filter.

Phospho-Muriate of Quinine Compound.

Quinine Hydrochloride,	32 grains
Strychnine,	1 grain
Solution of Phosphates, concentrated,	3 fl.ounces.
Syrup, enough to make	1 pint
Mix and dissolve.	

Quinia Laroche Tonic.

Red Cinchona Bark,	1 ounce
Sherry Wine,	20 ounces
Diluted Alcohol,	10 ounces
Sugar,	16 ounces
Soluble Iron Phosphate, (in scales),	262 grains
Water, sufficient.	

Infuse the cinchona in enough water to make 10 fl.ounces. In this dissolve the iron salt, add the wine and alcohol, and after several days filter.

Roxa Tonic.

Fluidextract Cinchona,	6 fl.ounces
Fluidextract Bitter Orange Peel,	2 fl.ounces
Tincture Cardamom Compound,	2 fl.ounces
Tincture Capsicum,	2 fl.ounces
Fluidextract Eucalyptus,	1 fl.ounce
Alcohol,	32 fl.ounces
Syrup,	20 fl.ounces
Water,	64 fl.ounces

Mix well together and, after standing, filter. This is an excellent general tonic.

Sa-Ka-To-Wa Tonic.

This is sold as an Indian remedy—as a tonic and generally as a liver and kidney medicine and alterative.

Fluidextract Cascara Sagrada,	4 ounces
Tincture Capsicum,	1 ounce
Fluidextract Rhubarb,	1 ounce
Socotrine Aloes,	2 ounces
Sodium Bicarbonate,	3 ounces
Potassium Acetate,	2 ounces
Porto Rico Molasses,	1 pint
Oil of Sassafras,	30 minims
Alcohol,	20 ounces
Water, sufficient to make	1 gallon

Dissolve the aloes, sodium bicarbonate and potassium acetate in 4 pints of boiling water; when cool add the fluidextracts and tinctures and the alcohol in which the oil has been dissolved; then the molasses and enough water to make 1 gallon. Allow to stand for 24 hours and strain. The dose is a dessertspoonful to a tablespoonful. It is an excellent tonic, laxative and regulator of the system.

TOOTH-ACHE REMEDIES.

Perhaps there is nothing in the line of remedies for which there is a more general call than tooth-ache cures or remedies, and it is certainly convenient and profitable to have something put up ready for this trade. As special proprietary preparations of this kind are seldom designated, it is obvious that the druggist may supply any good remedy for the purpose.

The following formulas will give satisfaction. These same remedies may also be used for ear-ache, neuralgia etc.

Aseptol Tooth-Ache Remedy.

Aseptol,	1 ounce av.
Chloroform,	1 fl.ounce
Alcohol,	14 fl.ounces

Cajuput Tooth-Ache Remedy.

Morphine Sulphate,	30 grains
Camphor,	1 ounce av.
Chloroform,	1 fl.ounce
Oil of Peppermint,	2 fl.drachms
Oil of Cajuput,	4 fl.ounces
Alcohol,	10 fl.ounces

Camphor-Chloral Tooth-Ache Cure.

Camphor,	1 ounce av.
Chloral-Hydrate,	1 ounce av.
Chloroform,	1 fl.ounce
Ether, (Sulphuric),	1 fl.ounce
Tincture of Opium,	$\frac{1}{2}$ fl.ounce
Oil of Thyme, (Origanum, pure),	$\frac{1}{2}$ fl.ounce
Oil of Sassafras,	$\frac{1}{2}$ fl.ounce
Alcohol,	16 fl.ounces

Mix and dissolve, saturate a little cotton and insert it in the cavity, also rub on the gums.

Carbolic Tooth-Ache Cure.

Carbolic Acid,	5 ounces av.
Camphor,	8 ounces av.
Oil of Sassafras,	$\frac{1}{2}$ fl.ounce
Oil of Cloves,	$\frac{1}{2}$ fl.ounce
Chloroform,	1 fl.ounce

Mix and dissolve, moisten cotton and put in the cavity of the tooth, and rub around the gums if necessary.

Clove Anodyne Tooth-Ache Cure.

Oil of Cloves,	2 fl.ounces
Carbolic Acid,	$\frac{1}{2}$ ounce av.
Oil of Peppermint,	2 fl.drachms
Morphine Sulphate,	30 grains
Alcohol,	13 fl.ounces

Cocaine Tooth-Ache Cure.

Cocaine Hydrochloride,	60 grains
Oil of Wintergreen,	2 fl.drachms
Oil of Peppermint,	2 fl.drachms
Alcohol,	15 fl.ounces

Lightning Tooth-Ache Remedy.

Essential Oil of Mustard,	1 fl.ounce
Chloroform,	2 fl.ounces
Oil of Sassafras,	1 fl.ounce
Alcohol,	12 fl.ounces

Local Anæsthetic.

This is for application to the gums previous to extracting teeth, and to numb the parts and prevent pain, also for neuralgia.

Menthol,	60 grains
Ether,	1½ ounces
Fluidextract Cannabis Indica,	20 minims
Cocaine,	2 grains
Oil of Peppermint,	15 minims

Saturate absorbent cotton with a small quantity of the liquid, and apply to the gums, allowing it to remain about 5 minutes before beginning the operation.

Menthol Tooth-Ache Remedy.

Menthol,	1 ounce av.
Chloroform,	1 fl.ounce
Alcohol,	14 fl.ounces

Odontunder.

This is a solution to rub around the gums previous to extraction and other dental operations. A preparation for that purpose is made with

Cocaine Hydrochloride,	10 grains
Thymol,	10 grains
Alcohol,	1 ounce
Glycerin,	2 drachms
Rose Water,	1 ounce

Dissolve the thymol and cocaine salts in the alcohol, add the glycerin and rose water. This may be applied by rubbing around the gums, or on cotton, or may be used by hypodermic injection to the roots of the teeth.

Salicylic Tooth-Ache Cure.

Collodion,	1 pint
Salicylic Acid,	2 ounces av.

Dissolve the salicylic acid in the collodion. This forms a plug in the cavity of the tooth, thus covering the exposed nerve.

Thymol Tooth-Ache Remedy.

Thymol,	1 ounce av.
Chloroform,	1 fl.ounce
Alcohol,	14 fl.ounces

Tooth-Ache Collodion.

Collodion,	1 ounce
Oil of Cloves,	1 drachm
Salicylic Acid,	1 drachm
Creosote,	1 drachm

Mix them. To use, saturate a little cotton on the end of a tooth-pick, by dipping it into the collodion, and insert it in the cavity.

Tooth-Ache Pellets.

Powdered Opium,	64 grains
Menthol,	16 grains
Cocaine Hydrochloride,	8 grains
Pill Excipient, sufficient to make	100 pellets

Make 100 pellets, as small as possible. To insert in the cavity of an aching tooth.

Tooth-Ache Wax or Gum.

Morphine Sulphate,	8 grains
Oil of Cloves,	12 minims
Yellow Beeswax,	80 grains

Melt the wax, and while cooling, incorporate with it the oil of cloves and morphine, and make into 100 pellets. Other ingredients may be added if wanted.

Other tooth-ache remedies may be made in the same general way from other drugs. They may be put up in homœopathic vials to sell at from 10 to 25 cents.

UTERINE REMEDIES AND CATHOLICONS.

Many uterine remedies will be found under other headings, a few however, which are specially known as uterine remedies or catholicons are given here.

Uterine Tonic or Catholicon.

The following is said to make a preparation similar to Lydia Pinkham's Compound:

Cramp Bark,	5 ounces av.
Partridge Berry Vine,	5 ounces av.
Poplar Bark,	2½ ounces av.
Unicorn Root,	2½ ounces av.
Cassia Bark,	1 ounce av.
Beth Root,	2 ounces av.
Sugar,	2 pounds
Alcohol,	2 pints
Water, sufficient to make	1 gallon

Grind the drugs to a coarse powder and percolate them with the alcohol mixed with an equal measure of water, continue the percolation with water until 7 pints of percolate have passed. In this dissolve the sugar.

Viburnum Compound.

Black Haw Bark,	12 ounces av.
High Cranberry Bark,	8 ounces av.
Blue Cohosh,	3 ounces av.
Life Root Plant,	3 ounces av.
Sugar,	4 ounces av.
Alcohol,	3 pints
Water, sufficient to make	1 gallon

Make a tincture of the drugs by percolating first with the alcohol mixed with an equal quantity of water, and then with water until 1 gallon is obtained. In this dissolve the sugar and filter.

The dose is a dessertspoonful.

Dioiviburnia, which is prepared by the Dios Chemical Co., of St. Louis, is similar to the foregoing; according to the statement of ingredients published. A formula may be made as follows: Fluidextract of black haw, cramp bark, wild yam, star-grass, helonias, mitchella, blue cohosh and scullcap, each, $1\frac{1}{2}$ ounces; simple elixir 4 ounces.

Hayden's Viburnum Compound.

Fluidextract cramp bark 2 fl.ounces, fluidextract black haw 1 fl.ounce, fluidextract skunk cabbage 1 fl.ounce, syrup 2 fl.ounces, strong tincture of cinnamon sufficient to make 16 fl.ounces. Mix, and after standing, filter.

This may be made from the drugs, an equal weight av., as above directed, with $1\frac{1}{2}$ ounces av. of cinnamon, percolated with diluted alcohol to make 14 ounces, then adding syrup 2 ounces.

Colorless Solution Hydrastine.

Hydrastine, White Alkaloid,	20 grains
Glycerin,	2 ounces
Diluted Hydrochloric Acid, q. s. to dissolve,	
Water, sufficient to make	1 pint

Rub the hydrastine with a portion of the water and add the acid, drop by drop, until it is dissolved, then add the glycerin and the remainder of the water.

This solution is used for injections because it does not stain the linen, as does the fluid hydrastis.

Orange Blossom.

This is in the form of vaginal suppositories, for uterine ulceration, prolapsus etc. They are to be inserted.

Zinc Phosphate,	60 grains
Alum,	15 grains
Cacao Butter,	180 grains
White Wax,	30 grains
Expressed Oil of Almonds,	90 grains
Extract of Hyoscyamus,	1 grain

Make into 1 dozen suppositories of square-oblong shape.

Uterine Tablets or Wafers.

Zinc Sulphate, dry,	60 grains
Alum, exsiccated,	120 grains
Boric Acid,	60 grains
Acetanilide,	30 grains
Acacia,	60 grains
Water,	2 drachms

Mix the powders intimately and moisten with the water, rubbing them well together; then make up into 12 oblong-square masses, pressing them into a form and allow to dry in the air. These wafers or tablets are used for ulceration, prolapsus, leucorrhœa etc., by inserting, or may be dissolved in water and used as an injection.

MEDICINAL WINES.

Most of the medicinal wines are included under that heading in Part II., but a few which are sold more particularly as proprietary medicines are given here.

Wine of Coca.

A wine of coca known as "Vin Mariani" has been extensively advertised and sold in this and other countries. No special claim is made for the superiority of this preparation, except the quality of the ingredients. Druggists may make and sell a wine of coca equal to any, but must not sell it as Vin Mariani.

The following makes a satisfactory preparation:

Coca Leaves, best quality, coarsely powd.,	12¾ ounces av.
Alcohol,	1 pint
Sugar,	6 ounces av.
Red Wine, a good quality,	1 gallon

Mix the alcohol with the wine and macerate the coca leaves with 2 pints of the mixture for 24 hours in a warm place, then transfer to a glass percolator, add the liquid and percolate slowly until a gallon is obtained. Dissolve the sugar in the percolate and filter.

Wine of Cod Liver Oil.

This preparation does not (as its name would indicate) contain cod liver oil, but is prepared from gaduol, an extract claimed to contain the valuable medicinal constituents of the oil.

Several wines of cod liver oil under various titles, as "Vinol," "Vinola," etc., have been extensively sold as proprietary medicines. The following formulas make satisfactory preparations of that kind:

Gaduol, (Extract Cod Liver Oil),	64 grains
Soluble Iron Phosphate,	128 grains
Alcohol,	4 fl.drachms
Glycerin,	4 fl.ounces
Fuller's Earth,	4 drachms
Port Wine, enough to make	4 pints

Mix the gaduol with the alcohol and add the fuller's earth; triturate well and add the glycerin and wine. Let stand a day or so, shaking occasionally, and add the soluble iron phosphate, previously dissolved in 1 ounce of hot water; then filter, passing sufficient wine through the filter to preserve the volume. Color with caramel.

If these directions are followed, the product will be an elegant preparation, resembling, but a little sweeter than other preparations of the same name.

A preparation of the same character as the above, but of a more distinctive taste and appearance, may be compounded as follows:

Gaduol,	64 grains
Soluble Iron Phosphate,	128 grains
Alcohol,	4 fl.drachms
Fuller's Earth,	4 drachms
Port and Claret Wine, equal parts, to make	1 pint

Proceed as before.

Kola Wine.

Kola Nut, in fine powder,	13¼ ounces
Tincture Cardamom Compound,	1 ounce
Sugar,	3 ounces
Good Red Wine, sufficient to make	16 ounces

Macerate the kola nut in 13 ounces of wine mixed with the tincture cardamom compound for 7 days, shaking daily, then pour upon a filter, add enough wine through the filter to make 13½ ounces of the filtered liquid and dissolve the sugar by agitation in the filtrate.

Vitalized Wine.

Phosphorus,	⅛ grain
Absolute Alcohol,	1 fl.ounce
Glycerin,	1 fl.ounce
Soluble Iron Phosphate,	64 grains
Prepared Wine,	14 fl.ounces

Dissolve the phosphorus in the absolute alcohol by means of a water-bath, add the glycerin, then the wine, dissolve the iron salt in the ½ fl.ounce of water and add to the solution. The dose is a dessert-spoonful to a tablespoonful.

WORM MEDICINES AND VERMIFUGES.

Worm medicines that are popular on the market are chiefly in the form of syrups or cordials, and confections or lozenges. Worm powders and pills, are however, frequently used, and "Worm Tea" is not an unpopular form of medication.

The following formulæ are representatives of various forms of worm medicines which have a popular sale:

Worm Killer.

Santonin, in fine powder,	$\frac{1}{4}$ ounce av.
Fluidextract of Pink Root,	$\frac{1}{2}$ ounce av.
Fluidextract of Senna,	1 fl.ounce
Essence of Peppermint,	20 minims
Simple Syrup, sufficient to make	1 pint

Mix them well together.

It is not intended that the santonin shall be dissolved in this preparation, but it must be shaken before taken. Santonin should never be dissolved when used as a worm medicine, for the reason that in solution it acts as a poison to the patient instead of to the worms because it is much more rapidly absorbed than when given in powder, and, as the medicine is designed to act on the contents of the stomach or bowels, instead of through the blood, it is obvious that it should not be in solution.

Tonic Vermifuge.

Male Fern Root, in coarse powder,	4 ounces
Anise Seed, Pink Root, each in coarse powder,	1 ounce
Cape Aloes,	120 grains
Potassium Carbonate, (Sal Tartar),	80 grains
Culver's Root,	$\frac{1}{4}$ ounce
Glycerin,	6 ounces
Alcohol,	6 ounces
Water,	6 ounces

Grind the drugs to a coarse powder and moisten with 3 ounces each of the alcohol and glycerin, pack in a percolator and pour upon them the remaining liquids in which the aloes and potassium carbonate have previously been dissolved, allow to stand 48 hours and percolate, adding enough water through the percolator to make 1 pint of the percolate.

Dose a teaspoonful to a dessertspoonful.

Standard Worm Syrup.

Pink Root,	16 ounces
Male Fern Root,	8 ounces
Senna Leaves,	16 ounces

Essence Anise,	2	ounces
Potassium Carbonate, Santonin, each,	$\frac{1}{4}$	ounce
Sugar,	7	pounds
Water, sufficient to make	1	gallon

Grind the drugs to a coarse powder and steep them for 6 hours in nearly boiling water enough to cover them well, then pour off the liquid and reserve; put fresh water on the drugs and steep 2 hours, pour off this liquid and mix with that before reserved, pressing out all that is possible from the drugs.

Evaporate the liquid to 5 pints and, while evaporating add the potassium and santonin; add while cooling, the essence anise and sugar, dissolve by agitation and strain.

Dose a teaspoonful to a dessertspoonful.

This is a good general worm syrup requiring no laxative after using it. It may be made from the fluidextracts instead of the drugs, if preferred.

Worm Syrup.

Fluidextract of Pink and Senna,	2	fl.ounces
Oil of Anise,	10	drops
Syrup, sufficient to make	1	pint

Mix. This is a simple "Pink and Senna" worm syrup, harmless and efficient; many other medicines may be combined with this, but we do not know that it can be much improved except by adding santonin.

Vermifuge.

This vile compound—the terror of childhood—thanks to the advance of pharmacy has largely gone out of use. The following formulas are sufficient:

Oil of Wormseed,	1	fl.ounce
Oil of Peppermint,	1	fl.drachm
Oil of Turpentine,	1	fl.drachm
Castor Oil,	6	fl.ounces
Mix them well together.		

Vermifuge.

Oil of Wormseed,	1	fl.ounce
Fluidextract Pink and Senna,	1	fl.ounce
Glycerin,	5	fl.ounces
Essence of Peppermint,	$\frac{1}{2}$	fl.ounce

Mix them well together, shake before taking. The usual dose of vermifuge is from one-half to a teaspoonful.

Worm Lozenges.

This is by far the most popular form of administering worm medicines, for children will readily take them. The making of worm loz-

enges is mostly done by manufacturing houses which have suitable apparatus for such work. Santonin is the chief medicinal ingredient; it is sometimes combined with calomel or other laxative remedies. The following formulæ make good worm lozenges, comfits or tablets. They can be made in the same way as other lozenges.

Santonin, in fine powder,	50 grains
Powdered Tragacanth,	150 grains
Chocolate,	300 grains
Powdered Sugar,	700 grains

Rub the chocolate with a little water to a stiff paste. Mix the santonin, tragacanth and sugar intimately, and with the addition of water incorporate them with the chocolate paste and cut into 100 lozenges.

Worm Lozenges or Tablets.

Santonin, in fine powder,	50 grains
Calomel,	5 grains
Carmine,	10 grains
Powdered Tragacanth,	150 grains
Powdered Sugar,	1000 grains

Mix the carmine intimately with a portion of the sugar, add the santonin and calomel, then the tragacanth, and having mixed them well together, make into a mass with water and cut into 100 lozenges. If white lozenges are desired omit the carmine.

Other combinations may be made in the same manner.

As each lozenge contains $\frac{1}{2}$ grain of santonin, the usual dose for children would be 1 or 2 before meals.

Vermifuge Tea.

Pink Root, in coarse powder,	4 ounces
Pomegranate Bark, cut,	4 ounces
Senna Leaves, cut,	4 ounces
Wormseed,	2 ounces
Anise Seed, ground,	2 ounces

Mix thoroughly and put up in packages of about 2 ounces.

Directions for preparing: Steep the contents of the package in a pint and a half of water with gentle heat for 2 hours, then strain off 1 pint, add to it half a pound of sugar and $\frac{1}{4}$ pint alcohol.

Directions for taking: For children 2 to 3 years old, a teaspoonful before meals, three times a day; 3 to 5 years old, two teaspoonfuls; 5 to 10 years old, a tablespoonful; 10 years and older, a wineglassful (2 tablespoonfuls) before meals.

Tape Worm Expeller.

Kamala,	$\frac{1}{4}$ ounce
Oleo-resin Male Fern,	40 minims

Acacia, powdered,	½ ounce
Water,	1 ounce
Syrup, sufficient to make	3 ounces

Rub the acacia with the water, add first the oleo-resin, then the kamala and triturate them thoroughly; then add enough syrup to make the measure 3 ounces and mix intimately.

For the expulsion of a tape worm the patient should go without breakfast, and at the usual breakfast hour take one-third of the above emulsion; another third in one-half hour and the remaining third one-half hour later. The tape worm will come away usually with the head within two or three hours.

Tape Worm Remedy.

Pomegranate Bark, ground,	3 ounces av.
Male Fern,	1 ounce av.
Senna Leaves, ground,	1 ounce av.
Kamala,	2 drachms

Mix them well together.

One-half of this quantity is to be steeped in a pint of water and the infusion is to be taken in doses of 4 ounces twenty minutes apart. If not successful in getting the head of the tape worm, the remainder can be prepared and taken in the same manner a week later.

Fluidextracts of the ingredients as above may be mixed in the same proportion and given in a similar manner, but are not considered so efficient as the infusion.

UNCLASSIFIED PROPRIETARY REMEDIES.

The following preparations were not included in the classes which have already been given. Many more formulas might be given but the line is already quite extended and is probably sufficient for the uses of the trade.

Antiphlogistine.

This is a type of proprietary antiseptic and absorbent preparation, composed of kaolin, glycerin and antiseptic medicaments, which are applied as a poultice or cataplasm, and have come into extensive use. "Antiphlogistine" was the first to appear, but many like preparations under other names have followed.

Cataplasma Kaolini, which is intended to be similar to this, was made official in the 8th revision of the U. S. P. See this title, page 492, Part II.

Bradycrotine.

This is a proprietary headache remedy made at Atlanta, Ga. A similar preparation may be made with

Caffeine,	6 grains
Potassium Bromide,	20 grains

Sodium Bromide,	20 grains
Syrup,	3 fl.drachms
Alcohol,	2 fl.drachms
Port Wine, sufficient to make	13 fl.ounces
Mix, dissolve and filter.	

Campho-Phenique. Carbolated Camphor.

Camphor,	5 ounces
Carbolic Acid,	2 ounces
Alboline, or Mineral Glycerin,	2 ounces
Mix and dissolve.	

Campho-Salicyl.

Camphor,	3½ ounces
Salicylic Acid,	2¾ ounces

Liquid Rennet.

The inner membrane of one calf's stomach, dissected off and chopped,	
Hydrochloric Acid,	6 fl.drachms
Glycerin,	6 fl.ounces
Water, sufficient to make	1 pint

Macerate for two weeks, strain or filter.

This is used for dyspepsia, and also in cooking to make curd, with milk.

Pepsin prepared from the stomachs of calves may be used instead of the fresh stomachs, but pepsin prepared from pig's or other stomachs will not make a curd with milk.

The dose is a teaspoonful to a dessertspoonful.

Godfrey's Cordial.

A great number of good formulas for this popular cordial have been published. The one claimed to be original is opium, cut fine, ¼ ounce; sassafras chips 1 ounce, cheap brandy 40 fl.ounces, water 40 fl.ounces, treacle 3½ ounces. The ingredients are to be mixed and macerated and the clear portion decanted.

The formula which is generally published for this cordial as it is put up for the trade is: Sassafras oil 24 minims, tincture of opium 2 fl.ounces, alcohol 3 fl.ounces, potassium carbonate 240 grains, Porto Rico molasses 1 pint, water 3 pints. Dissolve the oil of sassafras in the alcohol and add the solution to a mixture of the other ingredients.

Hamburger Drops.

Socotrine Aloes, in powder,	2 ounces
Myrrh, in powder,	½ ounce
Cinnamon Bark, in powder,	½ ounce

Cloves, in powder,	1	drachm
Opium, in powder,	1	drachm
Saffron, American,	2	drachms
Alcohol, sufficient to make	1	pint

Mix the drugs and macerate first with 12 ounces of alcohol for 1 week, with frequent agitation, and pour off the clear liquid and reserve; then pour on the drugs 6 fl.ounces more of alcohol, macerate as before and add the product to the reserved liquid.

The dose is 10 to 30 drops or more.

Fosgate's Anodyne Cordial.

A formula said to make a similar preparation is:

Fluidextract of Rhubarb,	5 fl.drachms
Fluidextract of Rhatany,	2 fl.drachms
Fluidextract of Ginger,	6 minims
Tincture of Opium, Camphorated,	1 fl.drachm
Diluted Alcohol,	6 fl.drachms

Mix them. Dose 20 to 60 drops, according to age.

Beecham's Pills.

The following formula is published in the Ind. Pharm.

Aloes, in powder,	480 grains
Rhubarb, in powder,	90 grains
Sodium Sulphate,	24 grains
Saffron, true,	24 grains

Make a mass and divide into 3 grain pills.

Concentrated Tincture Avena Sativa or Oats.

Common Black Oats,	16 $\frac{2}{3}$ ounces av.
Alcohol, sufficient to make	1 pint

Make a fluidextract or concentrated tincture.

This is given as a nerve stimulant in doses of 30 to 60 minims.

Pheno-Salyl.

This is an antiseptic introduced in the Pasteur Institute of Paris.

Phenol, (Carbolic Acid),	9 ounces
Salicylic Acid,	1 ounce
Lactic Acid,	2 ounces
Menthol,	44 grains

Mix the phenol and salicylic acid, and warm them with the lactic acid until melted, then, when cooling, add the menthol.

Holloway's Pills.

As these are much called for, the formula is given.

Aloes,	200 parts
Rhubarb,	40 parts
Black Pepper,	18 parts

Saffron,	10 parts
Sodium Sulphate,	10 parts
To be divided into $3\frac{1}{2}$ grain pills.	

Soda Mint.

Sodium Bicarbonate,	1 ounce av.
Peppermint Water,	1 pint
Aromatic Spirit of Ammonia,	1 fl.drachm
Mix, dissolve and filter.	

This may be sweetened with 2 ounces of sugar if desired, but for medicinal effect is usually given plain.

This is given in doses of a teaspoonful to a tablespoonful, for acid stomach, dyspepsia etc.

A mixture of sodium bicarbonate 8 ounces with spirit of peppermint ounce, may be made by rubbing them together in a mortar and allowing the alcohol to evaporate. This makes a convenient powder, $\frac{1}{4}$ teaspoonful to be dissolved in water when taken.

VETERINARY MEDICINE.

Including Poultry Remedies.

In a general way the same medicines are employed in veterinary practice as for the treatment of human ailments, the difference being in the forms of the medicines used and in the doses prescribed which must correspond to the average weight of the animal as compared with the average weight of man.

In the formulas that have been given in the foregoing sections of this work many are designated "pro usu veterinario," or for veterinary use. A considerable number of these are official in European countries and in the French pharmacopœia a section is specially devoted to "Pharmacie Vétérinaire."

Veterinary colleges, in which veterinary medicine, veterinary treatment and surgery are taught, have been established in many of the states, and this branch of medicine and therapeutics is now receiving the attention its importance merits.

Most of the medicines and preparations generally used in veterinary practice have been described in the preceding pages and will be found under different headings throughout this work. Condition Powders are the most common and convenient form for the administration of medicines to stock; therefore a few formulas for such as are most readily prepared are given here, also some other remedies that do not appear under other headings.

The doses of medicines for veterinary use should be about eight times as much for horses and cattle as for man; for sheep about the same as for man; for dogs and swine the dose varies considerably because of difference in size, but should be in proportion to their

weight as compared with the average weight of man (about 150 pounds). Doses for poultry are generally designated in the formulas for the few remedies used.

BALLS OR MASSES.

A common mass with which any active ingredient may be mixed can be best prepared with linseed meal and molasses, equal parts. The medicinal ingredients may be mixed with this vehicle in any proportion desired and the resulting mass made up into balls containing the required amount of the active agents.

Anodyne Ball. Opium 1 drachm, hydrated chloral $1\frac{1}{2}$ drachms, potassium bromide 1 drachm, linseed meal $\frac{1}{2}$ ounce, molasses, sufficient to make a mass or ball which is to be given at one dose.

Astringent Ball. Catechu, in fine powder, 2 drachms; cinnamon, powdered, 1 drachm; prepared chalk $\frac{1}{2}$ ounce; alum, powdered, 1 drachm. Mix them to make 1 powder, or mix into a ball with molasses or glycerin. One powder or ball is a dose for horses and cattle. A proportionate quantity for swine, dogs etc.

Condition Balls may be made with any of the condition powders incorporated with the common mass and divided into balls having the required quantity of medicinal ingredients.

Diuretic Ball. Potassium acetate 2 drachms, potassium nitrate 2 drachms, hard soap 2 drachms. Mix them into a mass with a little molasses or glycerin.

Physic Ball. Aloes, in powder, $\frac{1}{2}$ ounce; senna, in powder, $\frac{1}{2}$ ounce; gamboge, in powder, 30 grains. Mix and make into a ball with molasses. One ball is a dose for horses or cattle, one-fourth as much or less for dogs and sheep.

Cough Balls, Diuretic Balls, Physic Balls, Worm Balls etc., may be prepared by incorporating the medicines required with the common mass in a similar manner.

BALSAMS.

Many of the balsams for which formulas have been given in the previous pages of this work are used in veterinary practice. One particularly, Gombault's Caustic Balsam, has had an extensive sale as a proprietary veterinary remedy. The formula published on page 1153 is said to make a preparation quite similar to this. For external use only. Compound Tincture of Benzoin, (Friar's Balsam) is an excellent remedy for coughs and bronchial irritation. Peckham's Balsam is a good remedy either for internal or external use, and many other preparations known as "balsams" may be advantageously used in veterinary practice. The Balms also, for which formulas are given in this work, are much used in veterinary practice.

BLISTERS.

Most of the blisters used in veterinary practice are in the form of a soft ointment or a liquid which may be applied to the parts with a brush. These forms are selected for the greater convenience of application. Blistering ointments also are used upon parts where they can be made to stay in place. The *Acetum Cantharidis* of the Br. P. is a very good vesicant. It may be applied with a brush to any part of the body. *Unguentum Cantharidis* of the Br. P. may be warmed and applied with a brush or *Unguentum Cantharidum pro Usu Veterinario* of the P. G.

CONDITION POWDERS.

The sale of condition powders is general and considerable, and customers, as a rule, are not so particular about proprietary make as with other medicines. Many druggists already have some favorite formula for condition powders, therefore only a few general formulas are given here. Similar formulas may be made to suit the ideas of the manufacturers and put up under similar names.

Condition Powder — Vegetable.

For the Blood and Appetite.

Bloodroot, in fine powder,	1 ounce
Sassafras, in fine powder,	3 ounces
Liquorice Root, in fine powder,	3 ounces
Gentian, in fine powder,	1 ounce
Fenugreek Seed, in fine powder,	4 ounces
Senna, in fine powder,	2 ounces

Mix. Dose a tablespoonful or more in feed.

It will be observed that this powder is entirely vegetable and more expensive than any of the others. It may be made cheaper by adding to it an equal bulk of linseed meal.

Condition Powder — Mineral.

Blood Purifier and Tonic.

Potassium Nitrate, (Saltpetre),	2 ounces
Potassium Bitartrate, (Cream Tartar),	3 ounces
Iron Sulphate, (Copperas),	2 ounces
Antimony Sulphate, (Black Antimony),	1 ounce
Sulphur,	8 ounces

Powder and mix. Dose a tablespoonful or more in feed.

Condition Powder — Diuretic.

Appetizer, Tonic, Diuretic Etc.

Gentian, in fine powder,	1 ounce
Fenugreek Seed, in fine powder,	4 ounces
Black Antimony, in fine powder,	1 ounce

Liquorice Root, in fine powder,	3 ounces
Sal Nitre, in fine powder,	2 ounces
Linseed Meal, in fine powder,	3 ounces
Mix. Dose a tablespoonful or more in feed.	

Condition Powders — General.

Gentian, in powder,	1 ounce
Fenugreek Seed, in powder,	4 ounces
Ginger, in powder,	2 ounces
Liquorice Root, in powder,	3 ounces
Rosin, in powder,	3 ounces
Sulphur, in powder,	3 ounces
Mix. Dose a tablespoonful or more in feed.	

Condition Powder — General.

Sal Nitre, in powder,	1 ounce
Ginger, in powder,	2 ounces
Fenugreek, in powder,	3 ounces
Black Antimony, in powder,	1 ounce
Liquorice Root, in powder,	1 ounce
Linseed Meal, in powder,	8 ounces
Mix. Dose a tablespoonful or more in feed.	

Heave Powders.

For Coughs, Colds, Heaves Etc.

The demand for heave powders is not great, but they are readily put up, and have a steady sale. They are generally sold at extravagant prices, but it is better to charge a reasonable price, and recommend them for coughs, colds, influenza, distemper etc., instead of condition powders, which are considerably used for these complaints.

The following general formula has been proven excellent:

Lobelia, in fine powder,	2 ounces
Skunk Cabbage, in fine powder,	4 ounces
Elecampane, in fine powder,	4 ounces
Antimony and Potassium Tartrate,	1 ounce
Liquorice Root, in fine powder,	5 ounces

Mix them. Powdered elm bark in place of half the quantity of liquorice root may be used to advantage, and if desired to dilute the powder to make more bulk, linseed meal or powdered fenugreek may be added as desired.

The dose is a dessertspoonful to a tablespoonful or more.

Hog Cholera Powder.

Remedies for the prevention and cure of hog cholera are much used in the West and South. They are of various composition and merits. The following which is similar to Haas' Hog Remedy, is as popular as any:

Lime Phosphate, precipitated,	8 ounces
Common Chalk, in powder,	6 ounces
Magnesium Carbonate, powdered,	2 ounces
Capsicum, powdered,	½ ounce

Mix them well together.

The following is similar to another popular powder :

Sodium Bicarbonate,	2 ounces
Powdered Gentian,	2 ounces
Powdered Ginger,	3 ounces
Powdered Nitre,	1 ounce
Powdered Chalk,	8 ounces

Mix them thoroughly. Whiting may be used in place of chalk.

The doses of these powders are, as a preventive, from 1 to 2 teaspoonfuls in feed twice a day ; as a cure, a tablespoonful 3 or 4 times a day.

Poultry Powders.

Poultry powders are in considerable demand, and if prominently displayed, meet with a ready sale. The following formula gives excellent satisfaction :

Ground Bone, or Bone Dust,	12 ounces
Gentian,	1 ounce
Capsicum, powdered,	1 ounce
Ginger, powdered,	2 ounces
Sulphur,	1 ounce

Mix them well together. Put a teaspoonful or more in a quart of feed.

Slaked lime or precipitated phosphate of lime may be used in place of ground bone.

Egg Food.

This is designed to make hens or other fowl lay, and is in great demand in some sections. The following formula has proven satisfactory.

Phosphate of Lime or Ground Bone,	12 ounces
Capsicum, in powder,	1 ounce
Ginger, in powder,	2 ounces
Cantharides, in powder,	1 drachm
Sulphur,	1 ounce
Potassium Nitrate, in powder,	1 ounce

Mix them well together. Add a tablespoonful to a quart of feed.

Worm Powder.

For Worms and Bots in Horses and Cattle.

Cape Aloes, in powder,	5 ounces
Betel or Areca Nut, in powder,	8 ounces
Anise, in powder,	1 ounce
Fenugreek Seed, in powder,	2 ounces

Mix them well together. Dose 2 tablespoonfuls in feed, morning and night.

COLIC REMEDIES.

Colic may be simple belly-ache, caused by fermentation of food, indigestion or obstruction of the intestines, gas etc.—in such cases prompt cathartics and enemas are required. Colic may also be caused by renal obstruction or stopping of the urine, or by gall stones. In either of these cases relaxing and anodyne medicines should be given.

Colic Cure. A general remedy for colic may be made in liquid form as follows: Tincture of opium 1 ounce, tincture of aloes 2 ounces, chloroform 10 minims soft soap 2 ounces, linseed oil 1 pint. Mix the ingredients thoroughly and give at one dose, for horses and cattle.

Colic Remedy, Hypodermic. Eserine 10 grains, pilocarpine 20 grains, diluted alcohol 1 ounce. Dissolve the salts in the diluted alcohol. Give 30 minims of this solution by hypodermic injection and repeat if necessary.

FEVER, DISTEMPER AND INFLUENZA.

Tincture of aconite root 1 ounce, tincture of belladonna leaves 1 ounce, tincture of lobelia 1 ounce, diluted alcohol 1 ounce. Mix them. Dose 20 to 30 drops every hour until diaphoresis is produced. Keep the animal warmly covered with blankets. This remedy will break up influenza, distemper and fevers if begun in time.

Gall Cure.

Tannin, in fine powder,	2 ounces
Alum, in fine powder,	1 ounce
Lampblack,	1 ounce
Yellow Wax,	2 ounces
Petrolatum,	10 ounces

Melt the wax and petrolatum together and when nearly cool enough to set sift in the other ingredients, previously well mixed, and stir the mixture while cooling.

This is to be applied to the galled part and well rubbed in, leaving a thick coating of the salve over the part. The harness can then be put on and the horse worked as usual.

Hoof Ointment.

Turpentine, (Gum Thus),	2 ounces
Pine Tar,	2 ounces
Yellow Wax,	2 ounces
Petrolatum,	16 ounces

Melt the ingredients together and mix them thoroughly. This is applied to soften the hoofs and cure cracks, and relieve feverish condition.

PART IV.

TOILET PREPARATIONS AND PERFUMES

The formulas for preparations used for the toilet and as perfumes are so numerous that they would, of themselves, fill a large volume; therefore only the more important ones and those most in demand can be given in this work, but we have endeavored to so arrange them that as little space as possible will be taken, and at the same time a very complete line of reliable formulas for all classes of toilet requisites and perfumes will be given.

The more recent introduction of a number of synthetic chemical products having the odor of flowers or bouquets, has made it possible to prepare perfumes and toilet requisites with much less trouble and expense than formerly, when the pomades had to be washed to obtain the extracts. A full line of synthetic perfumes is given under that heading in this department, but the old formulas which have heretofore appeared in this work are also retained, as many of our readers have become accustomed to prepare the same formulas with which they and their customers have become familiar.

BANDOLINE.

Bandolines are intended to be used to "fix" the hair—that is, to make the hair stay as it is fixed. They were at one time considerably in demand; but as the style of dressing the hair has changed, they are now but little used. The following formula will make a satisfactory preparation:

Rose Bandoline. Best flake tragacanth 1 ounce, rose water 13 fl. ounces, Cologne spirit 3 fl. ounces. Mix the rose water and Cologne spirit and macerate the tragacanth in the mixture for several days,

stirring frequently, then squeeze through a cheese cloth strainer, let stand two or three days and again squeeze through muslin.

This makes a white translucent preparation, if desired it may be colored pink or red with solution of carmine.

BRILLIANTINES.

Brilliantines are oily liquids or pastes which are intended for application to the moustache as a dressing.

Brilliantine. Oil of almonds, expressed, 1 ounce; bulk perfume 1 drachm. Mix and shake them well together before applying.

Solid Brilliantine. Olive oil, best quality, 10 ounces, spermaceti 3 ounces, white wax 3 drachms, oil of bergamot 2 drachms, oil of cloves 15 minims, oil of rose geranium 30 minims. Melt the spermaceti and wax together, add the olive oil, warm until they are homogeneous, while cooling add the oils and pour into pots.

COSMETICS FOR THE COMPLEXION.

In a general sense the term cosmetic may be applied to preparations which are used to soften, cleanse, purify or beautify the complexion, hair, teeth etc.; but in this connection the preparations only, which are applied for beautifying the complexion will be noted. The preparations containing insoluble substances are best made by grinding them through a paint mill, but very good preparations may be made by rubbing them fine in a mortar as directed in the formulæ.

Liquid Cosmetics.

These are mostly preparations containing some insoluble ingredients which are intended to beautify the complexion, making the skin white or flesh tint, and covering tan, freckles etc.

Cream of Lilies, or Bloom of Youth. Heavy magnesia (Magnesia Ponderosa) $1\frac{1}{2}$ ounces av., zinc oxide 2 ounces av., glycerin 1 fl.ounce, water, sufficient to make 1 pint. Rub the magnesia and zinc with successive portions of water to wash them, transfer the precipitate to a pint bottle, and add the glycerin and enough water to make a pint. A little perfume may be added if desired.

Cream of Roses. Barium carbonate 2 ounces, prepared chalk 2 ounces, carmine, No. 40, 10 grains; potassium carbonate 5 grains, glycerin 1 fl.ounce, rose water, sufficient to make a pint. Rub the carmine and potassium carbonate together and add rose water gradually until it is dissolved. Mix the barium and chalk carbonates and having washed them by rubbing with successive portions of water, put the precipitate into a pint bottle, add the glycerin, the dissolved carmine and enough rose water to make a pint.

Imperial Face Bleach. Mercury bichloride, in powder, 60 grains; calomel 4 ounces, Cologne spirit 4 fl.ounces, water 20 fl.ounces,

glycerin 6 fl.ounces, essence bitter almonds 4 fl.drachms. Dissolve the mercury bichloride in the Cologne spirit, mix with the water, glycerin and essence of almonds, and add the calomel. To be well shaken when applied.

Liquid Pearl Enamel. Hubbuck's zinc oxide 2 ounces, prepared chalk 2 ounces, essence rose or almonds 1 fl.ounce, glycerin 1 fl.ounce, water a sufficient quantity. Rub the powders with successive portions of water to wash out any impurities and reduce them to a smooth and uniform precipitate, finally pour the precipitate into a pint bottle, add the essence of rose or almond and enough distilled or filtered rain water to make a pint.

Liquid Rouge or Bloom of Roses. This is used for giving a flesh tint or red coloring to the complexion, also for adding to any of the foregoing white preparations to impart a flesh tint. It is frequently put up in small bottles and furnished in a package with the white cosmetic. It is made as follows: Carmine, No. 40, 120 grains, potassium carbonate (Salts of Tartar), 60 grains; glycerin 4 fl.ounces, ammonia water $\frac{1}{2}$ fl.ounce, orange flower water 12 fl.ounces. Rub the carmine and potassium carbonate to a fine powder, add the glycerin, rub them well together, then add the ammonia and orange flower water. A small quantity of this liquid is applied to the cheek with a sponge or soft cloth and thoroughly rubbed in. For making a flesh tint of the white preparations add from 1 to $1\frac{1}{2}$ fl.drachms to a pint.

Peerless Face Bleach. Mercuric chloride 180 grains, ammonium chloride 20 grains, bismuth oxychloride 20 grains, tincture benzoin $\frac{1}{4}$ ounce, bulk perfume $\frac{1}{4}$ ounce, alcohol 2 fl.ounces, water 30 fl.ounces. Dissolve the mercuric chloride in the alcohol and add the tincture and bulk perfume to the solution, rub the bismuth with a portion of the water to a smooth mixture, dissolve the ammonium chloride in the remainder of the water and add to the mixture; then add the aqueous mixture gradually to the alcoholic solution, shaking frequently until all is added. This is to be shaken when applied.

Velvet Cream. Flake white 160 grains, pure oxide of zinc 80 grains, glycerin $1\frac{1}{2}$ fl.drachms, rose water, sufficient to make 4 ounces. Rub them well together, shake before using and apply with a soft sponge, let dry on and then remove excess of powder with a soft cloth.

Creams, Etc.

For Softening the Skin, Etc.

These are designed for softening the skin and removing tan, sunburn, freckles, chap etc. Several different kinds of preparations are put up for such uses, and the following formulas are representative of preparations found in the market:

Amandine. This is a preparation intended to whiten and soften the skin and prevent chapping etc. Honey, strained, 2 ounces; white soft soap 1 ounce, liquor potassa 1 fl.drachm, oil of sweet almonds 28

ounces, oil of bergamot $1\frac{1}{2}$ fl.drachms, oil of bitter almonds $1\frac{1}{2}$ drachms, oil of cloves 40 minims, balsam Peru 40 minims. Rub the honey with the soft soap in a mortar, add the liquor potassa, and when thoroughly mixed gradually add the almond oil, with which the other oils have been previously mixed, stirring them together to form an emulsion.

Bernhardt's Balm. The following is said to be the formula used by the divine "Sara" by which her youthful appearance is perpetuated: Ammonia water 2 ounces, spirit of camphor 2 ounces, sea salt 8 ounces, alcohol 12 ounces, boiling water, sufficient to make 32 ounces. Put all the medicinal ingredients in a quart bottle and add the water; shake before using. To be applied with a soft sponge and dried with the slight friction of a smooth towel.

Camphor Cream. Quince seed, in coarse powder, 60 grains; hot water 14 fl.ounces, borax, powdered, 60 grains; glycerin 2 fl.ounces, spirit of camphor 1 fl.ounce, oil of bitter almonds 10 minims. Macerate the quince seeds for half a day with the water and strain. Mix with the glycerin. Dissolve the oil of bitter almonds in the spirit of camphor and gradually add to it the mucilage of quince etc., and mix them thoroughly.

Cucumber Elder Flower Cream. Expressed oil of almonds 5 parts, saturated solution of borax 1 part. Emulsify by shaking well together and add to each pint 1 drachm of the following mixture of perfuming oils: Oil of bergamot 1 drachm, oil of lemon 2 drachms, oil of bitter almonds 10 drops. Mix thoroughly.

Flesh Food. A preparation designed to be used by massage for removing wrinkles, developing the bust etc., is extensively used by women. A satisfactory preparation may be made as follows: Almond oil or benne oil or liquid paraffin (mineral glycerin) 12 fl.ounces; white wax or paraffin wax or dry stearin 4 ounces; zinc oxide or flake white, in fine powder, 2 ounces; carmine, finely powdered, 30 grains; rhodinol II. or oil of rose, 10 minims. Melt the wax with the oil and while cooling incorporate the other ingredients.

Fragrant Cream. Quince seed 120 grains, borax, in powder, 60 grains; hot water 12 fl.ounces, glycerin 3 fl.ounces, cologne 2 fl.ounces. Crush the quince seed and macerate with the hot water for 1 hour, stirring frequently, then strain through muslin without pressure, add the glycerin and borax and then add to the translucent solution the cologne slowly, shaking them well together. One ounce of bulk perfume may be used instead of cologne. This is used for softening the skin, chap etc. By using double the quantity of quince seed, a preparation similar to "Frostilla" may be made.

Frosticream. Quince seed $\frac{1}{2}$ ounce, powdered borax 60 grains, hot water 12 fl.ounces, glycerin 3 fl.ounces, cologne 2 fl.ounces. Bulk perfume additional if desired.

Crush the quince seed and macerate with hot water for several hours, stirring frequently, then strain through muslin with pressure, add the glycerin and borax and then add the mucilaginous mixture to the cologne slowly, shaking them well together.

Glycerin Cream. Glycerin 6 ounces, soft soap (*sapo mollis*), 5 ounces, rose water, triple, 5 ounces, tincture of arnica $\frac{1}{2}$ ounce, boric acid $\frac{1}{2}$ ounce. Dissolve the acid in the glycerin by the aid of heat, and add the solution to the other ingredients which have been previously mixed in a mortar, incorporating them well together. This or any other cream may be perfumed with the synthetic perfumes as desired.

Imperial Vanishing Cream. Aluminum hydroxide 4 ounces, precipitated chalk 4 ounces, glycerin 4 ounces, water 4 ounces. Perfume as may be desired with oils, bulk perfumes or synthetic perfumes. The powders are to be intimately mixed and rubbed with the liquids to a stiff paste; the perfuming oils or extracts are to be added during the mixing. This can be sold as a cream containing neither lead, zinc or bismuth and no hydrocarbon oils. It is an excellent application for the skin for all purposes and, being greaseless, makes it a popular cream for the complexion.

Malvina Cream. White wax 3 drachms, white petrolatum 5 drachms, boric acid (in powder) 10 grains, tincture benzoin 30 minims, oil of bergamot 15 minims. Melt the wax and petrolatum together and while cooling add the boric acid, tincture of benzoin and oil of bergamot, stirring them well together until cool enough to set.

Marshmallow Cream. Tragacanth, in powder, $\frac{1}{2}$ ounce, marshmallow root, cut, $\frac{1}{2}$ ounce, water 12 fl.ounces, glycerin 3 fl.ounces, cologne 2 fl.ounces. Mix the glycerin with the water, add the tragacanth and marshmallow to the mixture and agitate frequently for several days, then strain through a muslin strainer, add the cologne, let stand two or three days and strain again.

Peerless Vanishing Cream. Zinc stearate 4 ounces, precipitated chalk 4 ounces, glycerin 4 ounces, water 4 ounces, rose geranium oil or rhodinol II. 30 minims. Mix the powders intimately and incorporate by rubbing them in a mortar with the mixed glycerin and water; add the perfuming oils while mixing. This makes a white preparation, if a pink preparation is desired it may be colored with carmine solution to the required shade.

Shaving Cream. White wax, spermaceti, almond oil, each $\frac{1}{2}$ ounce, shaving soap (Willams') 2 small cakes, rose water 2 ounces. Melt the soap with the rose water in a wide-mouth bottle. Melt the wax, spermaceti and almond oil together and add to the warm solution of soap, beating them together into a cream until cool.

Another formula is: Williams' soap 8 ounces, almond oil, cologne and glycerin, each 1 ounce; water 8 ounces. Make in the same manner.

Shaving Cream for Metal Tubes. Lard 16 ounces, spermaceti 1

ounce, caustic potassa 2 ounces, alcohol $\frac{1}{2}$ ounce, bitter almond 20 minims, water 16 fl.ounces. Melt the lard and spermaceti together on a sand-bath. Dissolve the caustic potassa in half the water and gradually add the solution to the melted lard etc., with gentle stirring. Dissolve the oil of almond in the alcohol, mix with the water, and while the soap is cooling, mix it thoroughly. This may be run into tubes while warm.

Theatre Cold Cream. Liquid paraffin (mineral glycerin) 12 ounces, dry stearin or white wax 4 ounces, precipitated chalk 1 ounce, zinc oxide 1 ounce, rhodinol I., 30 minims. Melt the stearin or wax with the liquid paraffin and while cooling incorporate the powders and perfume, stirring until cold. Other perfumes may be used if desired.

Rose. Add to each pound of the above 30 grains of carmine, first rubbed to a smooth paste with a portion, and then add the remainder, rubbing them well together.

Face and Toilet Powders Etc.

A great variety of toilet and face powders are found on the market, some in the form of powder, some in the form of balls or solid blocks or tablets. The following formulas represent the most desirable kinds.

Face Powder, white. Zinc oxide, English, (Hubbuck's) 6 ounces; precipitated chalk, English, 6 ounces; rice flour, bolted, 16 ounces; French chalk, very fine powder, 4 ounces; orris root, in very fine powder, 4 ounces; oil of santal 60 minims, oil of cloves 20 minims. The orris root must be reduced to an impalpable powder and thoroughly mixed with the other powders, the oils being then rubbed with a portion of the powder and the remaining powder gradually added and thoroughly mixed. The chief trouble usually experienced with face powders is to reduce them to the proper fineness. This is especially the case when orris root is used, as it is a very refractory substance to reduce to an impalpable powder. To obviate this difficulty, the extract of orris, such as is used in perfumery, may be used in place of the powdered root. It may be gradually mixed by rubbing it with the powder, and the alcohol evaporated off by exposing it for a few hours in the open air to gentle heat. This should be done before adding the essential oils.

Face powders may be perfumed with heliotropin, or a combination of heliotropin and coumarin, vanillin, or other synthetic perfumes instead of the perfuming oils. As they are in powder, they may be triturated with the zinc etc., and thoroughly blended.

Flesh. The flesh-tinted powders may be prepared from this or other white powders by first rubbing a little carmine to an impalpable powder, mixing it with a portion of the powder, then gradually incorporating more of the powder until the desired shade is obtained. It requires considerable care to incorporate the carmine so that it shall

not be streaked, and it may therefore be advisable to add it in the form of a solution, first with a portion of the powder, and then with enough gradually added to make the desired color.

Bloom of Ninon Face Powder. Precipitated chalk 4 ounces, bismuth subcarbonate 1 ounce, zinc oxide (Hubbuck's) $2\frac{1}{2}$ ounces, corn starch 4 ounces. Mix thoroughly and perfume with essence of orris and rose. This is known as Saunder's Face Powder.

Invisible Face Powder. French chalk 4 ounces, calcined magnesia 1 ounce, precipitated chalk 2 ounces, bismuth subcarbonate 1 ounce, carmine 30 grains. Mix them. Perfume to suit.

Peerless Face Powder. French chalk $2\frac{1}{2}$ ounces, corn starch 3 ounces, bismuth oxide $\frac{1}{2}$ ounce, precipitated chalk 4 ounces. Mix. Perfume to suit. Rice starch may be used instead of corn starch.

Rose or Violet Toilet Powder. The ordinary toilet or baby powder which is used as a drier or dusting after washing, and by barbers after shaving, may be made with wheat starch or arrow root, in fine powder, 1 pound; zinc oxide or bismuth oxide 4 ounces, orris root, in very fine powder, $2\frac{1}{2}$ ounces. This may be perfumed with essence of rose for rose powder, or with essence of orris for violet powder.

Talcum Toilet Powder. Zinc oxide (Hubbuck's) 2 ounces; talcum, in fine powder, 8 ounces; syringol, or some other strong synthetic perfume, 15 minims. Mix them well together by triturating in a mortar. This may be colored flesh tint if desired with carmine or red coloring as directed.

Theatre Face Powder. White. Precipitated chalk 12 ounces, zinc oxide 3 ounces, calcined magnesia 1 ounce. Mix them well together and add bulk perfume or solutions, 1 or 2 drachms to a small portion, rubbing them well together, then add the remainder of the powder. Mix thoroughly and pass through a sieve.

Flesh. To make a pink or flesh powder add to the foregoing carmine coloring 1 fl.drachm or sufficient. Rub it first with a small portion of the powder and add the remainder.

Brunette. To the white powder add to each pound raw umber $\frac{1}{2}$ ounce and mix them thoroughly.

Sunburn. To the white powder add to each pound burnt umber $\frac{1}{2}$ ounce, red lead 6 ounces, and mix them thoroughly.

DENTIFRICES.

Dentifrices or cosmetics for the teeth are found in the market in the form of tooth powders, tablets, pastes, washes and liquid saponaceous compounds. They are mostly to be used on a brush, and are put up in various ways to make them attractive and convenient for use. The following formulæ represent the different kinds of preparations which are in use:

Tooth Washes and Cosmetics.

Almond Tooth Cream. Tincture myrrh, tincture tolu, each $\frac{1}{2}$ ounce; oil bitter almonds 20 minims, powdered borax $\frac{1}{2}$ ounce, glycerin 2 ounces, hot water 13 ounces. Mix the tinctures and dissolve in the mixture the oil of bitter almonds, dissolve the borax in the hot water and add the glycerin, add the solution of borax very gradually (by dropping as directed in the formula for Balsamic Tooth Wash) to the tinctures etc.

Antiseptic Tooth Wash. Tincture quillaja 4 ounces, saccharin 15 grains, borax 30 grains, oil of sassafras 20 minims, Cologne spirit 4 ounces, carmine 1 drachm, water sufficient to make 1 pint. Dissolve the oil and saccharin in the alcohol, the borax in the water, then mix altogether and filter.

Arnica Tooth Wash. Arnica flowers 1 ounce, gum myrrh $\frac{1}{4}$ ounce, cloves 60 grains, cinnamon 60 grains, oil of peppermint 40 minims, Cologne spirit enough to make 1 pint. Grind the drugs to a fine powder and percolate with the Cologne spirit until 1 pint is obtained, and add the oil of peppermint, filter if necessary.

Balsamic Tooth Wash. Compound tincture of benzoin, tincture tolu, tincture myrrh, each $\frac{1}{2}$ ounce, white Castile soap 1 ounce, hot water 10 ounces, glycerin 2 ounces, Cologne spirit 3 ounces, oil of peppermint 40 minims, oil of wintergreen 20 minims, oil of cloves 10 minims. Mix the tinctures and the Cologne spirit, and dissolve the oils in the mixture. Cut the soap in fine shavings and dissolve in the hot water; add the glycerin to this solution. Add the saponaceous solution very gradually to the solution of oils and balsams, allow to stand 24 hours, shaking occasionally, then filter, adding a little powdered charcoal to the filter.

The saponaceous solution can be best added to the balsamic solution by putting a cork in a funnel so that it will be added drop by drop.

The soap solution must always be added to the balsamic solution.

Carbolated Tooth Wash. Carbolic acid 20 grains, alcohol 1 drachm, eau Angelique 1 pint, dissolve the carbolic acid in the alcohol and add the eau Angelique. Carbolic acid may be added to any of the other tooth washes in the same proportion as above. It makes a valuable addition in many cases as it destroys the odor of decayed teeth and offensive breath.

Dentifoam. A liquid dentifrice. Quillaja, (soap bark), ground, 1 ounce; borax, powdered, 2 drachms; oil of sassafras 20 minims, oil of wintergreen 20 minims, oil of rose 5 minims, oil of cassia 5 minims, glycerin 3 fl.ounces, alcohol 5 fl.ounces, water 8 fl.ounces, carmine solution, sufficient to color. Infuse the quillaja and borax with boiling water for 1 hour, and strain, adding enough water through the strainer to make 8 ounces, add to this the glycerin and alcohol in which the oils have been dissolved, then add the carmine solution

sufficient to make the desired color, and after standing, filter clear, using if necessary in the filter a little precipitated calcium phosphate. Other perfuming oils may be used if desired.

Eau Angelique. Angelica root, true, $\frac{1}{2}$ ounce; red rose leaves 2 drachms, cloves 90 grains, nutmeg, cinnamon, each 60 grains; extract vanilla $\frac{1}{2}$ ounce, oil of peppermint 30 minims, oil of wintergreen 20 minims, Cologne spirit 14 fl.ounces, glycerin 2 fl.ounces, cochineal 8 grains. Grind the drugs to a fine powder and macerate for 7 days with the mixed glycerin and Cologne spirit; pour off the liquid and put the drugs in a percolator; pour the liquid upon the drugs and percolate, adding enough Cologne spirit through the percolator to make 1 pint. Dissolve the oils in 2 drachms of Cologne spirit, adding a little powdered carmine in the filter.

Imperial Tooth Cream. Tincture myrrh 1 ounce, tincture tolu 1 ounce, borax, in powder, 1 ounce; precipitated chalk 2 ounces, Castile soap, in powder, 1 ounce; essence of wintergreen 1 ounce, glycerin 3 ounces, water sufficient to make 32 ounces. Dissolve the borax and soap in 1 pint of hot water and add the glycerin; mix the tinctures and the wintergreen essence and add the solution of soap and borax very gradually to the mixture, shaking occasionally. Finally strain the mixture through a coarse cotton cloth and add the precipitated chalk, rubbing them well together in a mortar. Shake before using.

Other perfumes may be used instead of the wintergreen if desired. Essence almond makes a good flavor. Compound tincture benzoin may be used instead of either the myrrh or tolu to a good advantage.

Imperial Tooth Wash. Soap bark, in coarse powder, 6 ounces; orris root, in coarse powder, 3 ounces; alkanet root $\frac{1}{2}$ ounce, oil of wintergreen 2 fl.drachms, oil of cloves 15 minims, oil of cassia 20 minims, glycerin 4 fl.ounces, Cologne spirit 16 fl.ounces, water sufficient to make 2 pints. Moisten and macerate the drugs with 8 ounces of the Cologne spirit mixed with 8 ounces of water, after standing 3 or 4 days percolate, adding through the percolator first the remaining Cologne spirit mixed with 8 ounces of water; then continue the percolation with water until 28 ounces of the percolate is obtained. Dissolve the oils in half an ounce of the Cologne spirit, then add the glycerin, and after standing, filter.

Saponaceous Tooth Wash. White Castile soap 1 ounce, oil of cloves, oil of cinnamon, of each 10 minims; oil of wintergreen 15 minims, oil of peppermint 20 minims, hot water 4 ounces, alcohol or Cologne spirit 10 ounces, glycerin 2 ounces. Cut the soap in thin shavings and dissolve in the hot water, dissolve the oils in the alcohol, add the solution of soap and glycerin and color with cochineal or caramel, or both; filter; add a little powdered charcoal in the filter.

"Sozodont." This is a proprietary dentifrice, a similar preparation may be made with white Castile soap $1\frac{1}{2}$ ounces, glycerin 4 ounces,

Cologne spirits, water, each, 6 ounces; oil of peppermint 20 minims, oil of wintergreen 30 minims, oil of cloves 10 minims, extract of vanilla $\frac{1}{2}$ ounce. Cut the soap in fine shavings and dissolve it in water by the use of heat, then add the glycerin and extract of vanilla; dissolve the oils in the alcohol and add, after standing, filter.

Tooth Pastes.

Tooth pastes are favorite dentifrices, made up in the form of a soft mass and usually put up in flat earthen jars.

Charcoal Tooth Paste. A charcoal tooth paste may be made by using 4 ounces of charcoal, in fine powder, instead of the soap, in the preceding formula.

Cherry Tooth Paste. Precipitated chalk 8 ounces, powdered orris root 8 ounces, powdered areca nut 2 ounces, powdered cuttle bone 2 ounces, powdered quillaja bark 1 ounce, borax, in powder, 1 ounce, carmine, in fine powder, or solution of carmine, a sufficient quantity; oil of cloves, oil of nutmeg, each 40 minims; oil of bitter almonds 30 minims, oil of rose 10 minims, glycerin, honey and mucilage acacia, equal quantities, each a sufficient quantity to make into a mass. Mix the powders first and color with carmine or carmine solution, then make into a mass.

Odontine Paste. French chalk 8 ounces, soap, in powder, 4 ounces; sugar 4 ounces, gum arabic, in powder, $\frac{1}{2}$ ounce; peppermint oil, wintergreen oil, each, 1 drachm; glycerin and honey, sufficient to make a mass. This may be colored if desired.

Saponaceous Tooth Paste. Precipitated chalk 4 ounces, powdered orris root 4 ounces, white Castile soap 1 ounce, powdered borax 1 ounce, powdered myrrh $\frac{1}{2}$ ounce, honey and glycerin, equal parts, a sufficient quantity to make a paste. This may be perfumed with wintergreen, cassia or other flavors, and colored with carmine or rose pink, if desired.

Tooth Paste for Metal Tubes. A tooth paste for putting up in metal tubes may be made from any of the foregoing formulas by making them much thinner with glycerin and honey than they are when intended to be put up in jars or pots.

Tooth Powders.

Tooth powders are the most frequently sold of any of the dentifrices, probably because they are better known and are furnished at a less price, a great variety are found on the market. The following formulæ make preparations similar to a few of the best:

Tooth Powder. (General Formula). Precipitated chalk 8 ounces, powdered cuttle bone 4 ounces, orris root, in powder, 3 ounces; powdered borax 1 ounce, oil of cloves 10 minims, oil of wintergreen 2 fl.drachms, carmine solution a sufficient quantity. Mix the powders and with a small portion incorporate the oils and sufficient of the car-

mine solution to color the batch, making a moist powder; to this gradually add the remainder of the powder, rubbing the mixture well together until they are thoroughly mixed and of a uniform color and flavor. This may be flavored with other flavoring oils in place of those mentioned, as desired, giving it an entirely different flavor. Various substances may be added to this powder, changing it in appearance, flavor etc., but it is essentially the basis of all the other powders and may be kept in stock for mixing other substances, as powdered pumice stone or marble dust, which may be used instead of powdered cuttle bone, but the latter is generally preferable.

Antiseptic Tooth Powder. Precipitated chalk 8 ounces, saccharin 30 grains, borax 60 grains, oil of sassafras 60 minims, oil of wintergreen 90 minims, oil of cloves 10 minims. Mix well.

Camphorated Tooth Powder. Mix camphor, in fine powder, 1 ounce, with 20 ounces of the general tooth powder, and when thoroughly mixed pass through a fine sieve.

Imperial Tooth Powder. English precipitated chalk 3 pounds, calcined magnesia $\frac{1}{2}$ pound, powdered sugar $\frac{1}{2}$ pound, oil of sassafras $\frac{1}{2}$ ounce, oil of wintergreen $\frac{1}{4}$ ounce, alcohol 2 ounces. Mix the powders intimately, dissolve the oils in the alcohol, put a portion of the powder in a mortar and incorporate with it by rubbing with the solutions of oils, then gradually add the remainder of the powder, rubbing well with the portion in the mortar, so that they may be thoroughly mixed.

Rose Tooth Powder. Precipitated chalk 8 ounces, powdered orris root 4 ounces, powdered cuttle bone 4 ounces, carmine, in fine powder, 2 drachms, or sufficient to color; oil of rose 30 minims, oil of santal wood 5 minims, oil of cassia 5 minims. Mix them well together as directed in the general formula.

Saponaceous Tooth Powder. Precipitated chalk 8 ounces, powdered cuttle bone 4 ounces, powdered white soap 4 ounces, oil of wintergreen 2 drachms, oil of calamus 10 minims. Mix them well together.

It is needless to give further formulas for tooth powders, as an infinite variety may be made in the same general manner as has been described in the foregoing, it being only necessary to change the flavor or color and add such other antiseptics or other ingredients as may be desired.

Tooth Tablets. These are simply tooth powders put up in the form of cakes or squares, and may be made as follows: Powdered cuttle bone or pumice stone 4 ounces, orris root, in powder, 4 ounces; magnesium carbonate 4 ounces, white Castile soap 4 ounces, gum arabic, in fine powder, 1 ounce; water 6 ounces, essence of wintergreen 2 ounces. Beat the Castile soap and gum arabic with the water and essence of wintergreen and, having mixed the other powders, gradually incorporate them with the mixture by working in a mortar the

same as a pill or lozenge mass. Then roll out and cut out or mark as desired into squares, and dry them with gentle heat.

Mouth Waters.

In this connection it is proper to give a few formulas for mouth waters, which are used for rinsing the mouth and teeth, preventing bad breath etc.

Eau de Botot or Mouth Water. Anise seed 1 ounce, Ceylon cinnamon $2\frac{1}{4}$ ounces, cloves 75 grains, cochineal $\frac{1}{2}$ ounce, oil of peppermint $\frac{1}{2}$ ounce, alcohol sufficient to make 20 fl.ounces. Grind the drugs and macerate with the alcohol, then percolate until 20 ounces have passed and dissolve the oil of peppermint in the percolate. This may be more readily made with oil of anise $\frac{1}{2}$ ounce, oil of cinnamon 1 drachm, oil of peppermint $\frac{1}{2}$ ounce, oil of cloves 10 minims, dissolved in alcohol 19 fl.ounces. A teaspoonful of this poured into half a glass of warm water for rinsing the mouth and teeth. It may be applied to the teeth also with a brush, simply to clean them.

Salicylic Mouth Water. Salicylic acid 20 grains, oil of peppermint 10 drops, oil of wintergreen 20 drops, alcohol 2 fl.ounces, orange flower water, distilled water, each, $2\frac{1}{2}$ fl.ounces. Mix the oils and acid with the alcohol and add the waters. This is to be diluted with 2 to 4 parts of water when used.

Violet Mouth Water. Extract of orris root 8 ounces, essence of rose 8 ounces, oil of bitter almonds 5 drops, alcohol 8 ounces. Mix them. Use 1 teaspoonful in half a glass of water for rinsing the mouth etc.

HAIR PREPARATIONS.

A great variety of hair preparations are found in the market and many of them may be profitably put up by druggists. The following formulas cover the line of preparations generally in use.

Remedies for Baldness. (Alopecia).

Many of the hair tonics, hair growers and preparations for which formulas will be found elsewhere are good remedies for baldness, but a few specially designed for that purpose are given here.

Remedy for Baldness. Cantharidin 2 grains, acetic ether $\frac{1}{2}$ ounce, alcohol 6 ounces, castor oil 2 ounces, oil of bergamot 20 drops. Rub the cantharidin with the acetic ether and add the alcohol, then add the oils and mix thoroughly. This is to be applied twice a week with friction.

Cure for Baldness. Pilocarpine alkaloid 10 grains, cantharides, in fine powder, 20 grains; petrolatum 1 ounce, oil of lavender 5 minims. Melt the petrolatum and digest the cantharides with it at a moderate heat for 2 hours, then strain and while cooling add the pilocarpine dissolved in a little alcohol and lastly, the perfume. Apply at night.

Dandruff Remedies.

Dandruff cures have been extensively advertised for the past few years and have had a large sale. In a general way the hair tonics are good dandruff remedies, but in addition a few are given here that may be better suited to that purpose.

Dandruff Cure. Salicylic acid 2 drachms, borax, in powder, 1 drachm; oil of bergamot 1 drachm, oil of bitter almonds 5 minims, alcohol 6 ounces, glycerin 1 ounce, water 8 ounces, caramel sufficient to color slightly brown. Dissolve the oils and acid in the alcohol, dissolve the borax in the water, add the glycerin and mix the two solutions.

Dandruff Remedy. Boric acid 2 drachms, naphthol 15 grains, fluid-extract jaborandi 2 drachms, oil of bitter almonds 5 minims, oil of lavender 15 minims, alcohol 6 ounces, glycerin 1 fl.ounce, orange flower water or rose water 8 ounces. Dissolve the oils and salts in the alcohol and mix with the glycerin and orange flower water.

Peerless Dandruff Cure. Mercuric chloride $\frac{1}{2}$ ounce, distilled water 32 ounces. Dissolve, and after standing, filter. This should be applied to the scalp once a week, and followed the next day by an application of Peerless Hair Tonic, which see.

Some of the shampoos and lotions for the hair given in this section are excellent for dandruff.

Depilatories.

Depilatories are preparations designed to remove superfluous hair by killing its roots. They are but little used, the electric needle being now considerably used for killing the hair roots.

Depilatory Collodion. Iodine 12 grains, oil of turpentine 20 drops, castor oil 30 drops, alcohol 4 drachms, collodion 1 ounce. Dissolve the iodine in the alcohol and add the solution with the other ingredients to the collodion.

Depilatory Liquid. Quicklime, in powder, 1 ounce; potassium carbonate 1 ounce, sugar 2 ounces, water 4 ounces. Boil them together and after standing, decant. The caustic liquid may be applied as it is, or mixed with starch paste.

Depilatory Paste. Freshly-slaked lime 1 ounce, starch, in fine powder, 2 drachms; glycerin 2 ounces, water $\frac{1}{2}$ ounce. Heat the starch with the glycerin on a sand-bath until it is gelatinized, then mix the lime with the water and stir with the paste until thoroughly mixed. The hair is to be shaved off close, this is then to be applied and left on for only a few moments (3 to 5 minutes), then removed and the part dressed with cream or soft ointment.

Depilatory Powder. Arsenic 1 part, quicklime 8 parts, well mixed together. When used this is to be mixed with glycerin or starch or

soft soap. It should be freshly made when wanted. As this is quite poisonous as well as caustic it should be handled with caution.

Peerless Hair Remover. Sodium sulphide 1 ounce, water 16 ounces. Dissolve the sodium sulphide in the water. Apply this solution to the hair by means of a cotton-batting swab attached to a stick. It may be applied freely. Allow the solution to remain on the hair for 10 minutes, then wipe the skin with a cloth and the hair will come off. If not entirely removed at first repeat the operation.

Be sure you use sodium sulphide, not sodium sulphite. Do not allow the solution to get on the finger nails as it softens them.

Hair Dyes.

Preparations for the hair, to dye or change its color and promote its growth are extensively sold as proprietary remedies. The following formulæ are the best of the kinds used for their purposes:

"Lightning Dye," Black for the Hair and Whiskers.

This is similar to the dye used by barbers. It is composed of a mordant and a dye, as follows:

No. 1. Mordant.

Pyrogallic Acid,	3 drachms
Alcohol,	5 fl.ounces
Water,	11 fl.ounces
Mix and dissolve.	

No. 2. Black Dye.

Nitrate of Silver, (crystals),	2 ounces av.
Aqua Ammonia, q. s., or about	4 fl.ounces
Distilled Water, q. s., or about	12 fl.ounces

Dissolve the nitrate of silver in 8 fl.ounces of the distilled water and add 3 ounces of the aqua ammonia. This will produce a dark brown precipitate. Continue to add aqua ammonia in small quantities until the precipitate is entirely redissolved, then add enough distilled water to make a pint.

In making this preparation for black dye no more aqua ammonia must be used than is necessary to dissolve the precipitate, for a larger quantity than is necessary lightens the color.

Lightning Dye—Brown.

Silver Nitrate,	1 ounce av.
Ammonia Water, q. s., or about	2 fl.ounces
Sodium Carbonate, (Sal Soda),	3 drachms
Water, q. s., or about	10 fl.ounces

Dissolve the silver nitrate in 8 ounces of water and add ammonia water until the precipitate which is formed is dissolved; dissolve the sal soda in the solution and add enough water to make 12 fl.ounces and, after standing a few days, decant.

To apply these dyes the hair or whiskers are first washed with soda water or soap suds to remove any grease or oil, the mordant is then applied and allowed to dry; the dye is then put on carefully with a tooth-brush or other convenient utensil and dried by fanning; the hair, when dry, is then washed with soap suds to remove any superfluous dye and dried.

Use the same mordant for this dye as for the black.

Hair Dye — Black. (One Preparation).

Silver Nitrate,	2 ounces
Copper Nitrate,	30 grains
Ammonia Water, about	4 fl.ounces
Distilled Water, enough to make	1 pint

Dissolve the silver and copper nitrates in 8 ounces of distilled water and gradually add the ammonia until the precipitate first formed is redissolved, then add sufficient distilled water to make a pint.

This dye may be used without a mordant.

Bismuth Hair Dye. Bismuth trisnitrate 1 ounce, glycerin $3\frac{1}{2}$ fl.ounces. Dissolve the bismuth in the glycerin. When desired to use mix the dye with an equal quantity of water and apply as usual, and after using apply sodium hyposulphite solution.

Blondine. This is used for producing a blond color for the hair. It is simply solution of hydrogen dioxide or peroxide. Marchand's Solution may be used, or the official Aqua Hydrogenii Dioxidii. The hair is first washed with a weak solution of soda to remove any grease or oil, then dried, and the solution applied and dried by ironing with a flat-iron. Several applications are necessary.

Peerless Hair Water. Silver nitrate $\frac{1}{2}$ ounce, distilled water 32 ounces, ammonia water sufficient. Dissolve the silver nitrate in the water and add a little ammonia water, this will first cause a white cloud. Shake, then add ammonia water, a few drops at a time, sufficient to make the preparation clear but not to make an excess of ammonia.

This is a weaker dye intended to be used by women for coloring the hair. After washing the hair free from grease, with water in which a little borax has been dissolved, apply the hair water with a brush, combing it in until the hair is well moistened, then allow it to dry. If any stains appear upon the skin they may be removed by wiping with a cloth moistened with weak ammonia water.

Vanadium Hair Dye. This is applied with two preparations in the same manner as the silver nitrate dye (see index) using the same mordant, and then apply the vanadium solution in the same manner as the silver dye. The vanadium solution is made with ammonium vanadate 10 grains, dissolved in water 4 ounces.

Hair Growers.

For promoting the growth of the hair many preparations of an oily nature are used. Several such preparations are noticed under Hair Tonics; the following are added in this department. These are particularly used for thin or falling hair, baldness etc.

Bay Hair Grower. Castor oil 10 ounces av., tincture of cantharides 1 fl.ounce, Cologne spirit 5 fl.ounces, oil of bay leaves 20 minims, oil of pimento 5 minims, oil of bergamot 30 minims. Mix them. This may be colored red if desired with tincture of alkanet.

Cocoaine or Cocoa Cream. Cocoanut oil 1 ounce, castor oil 8 ounces, Cologne spirit 7 ounces, oil of bergamot 1 drachm, oil of lemon $\frac{1}{2}$ drachm. Melt the cocoanut oil by gentle heat and add to it the castor oil, previously warmed, add the Cologne spirit and, when cool, the flavoring oils.

Hair Grower. Neutral paraffin oil or cotton seed oil 1 pint, cantharides, in coarse powder, 60 grains; alkanet root, in coarse powder, $\frac{1}{2}$ ounce; oil of cinnamon 5 minims, oil of lemon 30 minims, oil of citronella 10 minims, oil of bergamot 60 minims. Enclose the cantharides and alkanet in a coarse muslin bag and digest in the oil by the aid of a water-bath, at a moderate heat, for 12 hours, occasionally squeezing the bag and then, when cool, add the perfuming oils.

Hair Grower Pomade. Petrolatum 1 pound, tincture cantharides 1 $\frac{1}{2}$ ounce, oil of cinnamon 10 minims, oil of bergamot 60 minims, oil of citronella 20 minims, oil of cloves 5 minims. Melt the petrolatum, add the tincture and, while cooling, add the oils.

Carboline Hair Grower.

Neutral Paraffin Oil,	1 pint
Tincture Cantharides,	4 fl.drachms
Euphorbium,	20 grains
Oil of Rosemary,	4 fl.drachms
Oil of Cassia,	20 minims
Oil of Cloves,	5 minims

Heat the euphorbium and tincture of cantharides for 2 hours with the paraffin oil, then strain and add the other oils. This is used for promoting the growth of the hair, baldness etc. It should be rubbed thoroughly on the scalp.

Hair Lotions.

Hair lotions differ from hair oils in containing but little or no oil. They are applied more freely to the hair and intended to promote its growth and give it a gloss or luster, also to clean the scalp and remove dandruff, eruptions etc.

Almond Hair Lotion. Cologne 4 ounces, glycerin 1 ounce, water of ammonia $\frac{1}{2}$ ounce, bitter almond or cherry laurel water 4 ounces. Mix them.

Bay Hair Lotion. Make the same as the foregoing, only use bay rum instead of cologne.

Bay Rum. A great many formulas for bay rum have been published but we see no reason to change the formula which we published many years ago, which quite closely imitates the imported distilled bay rum, and gives excellent satisfaction. It was as follows: Oil of bay leaves 2 fl.drachms, oil of bergamot 30 minims, oil of pimenta 15 minims, acetic ether 15 minims, caustic soda or concentrated lye 2 drachms, Cologne spirit $3\frac{1}{2}$ pints, water $4\frac{1}{2}$ pints, grass-green coloring or chlorophyll, sufficient. Mix the oils and dissolve them in the Cologne spirit, dissolve the caustic soda in the water and gradually add the acetic ether and enough of the grass-green coloring to give the desired color and, after standing a few days, filter through a glass funnel without using a filter rack or any metallic substance.

Hair Gloss. Glycerin 12 ounces, cologne 4 ounces. Mix them. Hair gloss may also be made with glycerin and rose water, or orange flower water, mixed equal parts by measure.

Rose Hair Lotion. Make the same as the first mentioned but use rose water instead of almond water. Many others may be made in a similar manner.

Stimulating Hair Lotion. For thin hair, baldness etc. Tincture cantharides 2 drachms, acetic ether 2 drachms, glycerin 2 ounces, bay rum 6 ounces. Mix them. Cologne diluted with an equal quantity of water may be used instead of bay rum.

Hair Oils, Etc.

These are liquid preparations intended as a dressing for the hair to keep it soft and glossy, clean the scalp etc. A great variety of such preparations may be made but they are much less used than formerly. A few formulas, only, will be necessary, for with a good base, the perfumes may be varied to suit the taste. The following bases may be used:

Castor Oil Base for Hair Oil. Castor oil 12 fl.ounces, alcohol 5 fl.ounces. Mix them. As castor oil mixes in all proportions with alcohol this may be made thinner if desired by using a larger proportion of alcohol.

Other Hair Oil Base. Oil of benne, oil of almond, oil of mustard seed, oil of cotton seed, refined lard oil, salad oil, hickory-nut oil and white neutral paraffin oil are all good bases for hair oils. They may be perfumed with any combination of perfuming oils desired and colored to suit the taste.

Coloring for Hair Oils. Hair oils are best colored red by infusing them with alkanet contained in a thin cotton bag, occasionally squeezing out the coloring matter. No other substance gives so fine a red color to oils as this. The oils may be heated or macerated cold,

but it requires longer if prepared cold. Other colors for hair oils are seldom required, but they can be colored orange or yellow with annatto, or green with fresh lawn grass.

Walnut Hair Oil. As a sample of hair oils that may be made by macerating substances of various kinds in oils, the following is given: Crush 2 ounces of fresh green walnut shells with $\frac{1}{4}$ ounce of powdered alum to a smooth paste, digest with 10 ounces of white neutral paraffin oil or any bland vegetable oil, as cotton seed or other oil, until all vapor has been driven off, then strain and perfume as desired. Fresh violet flowers or orris or other odorous substances may be macerated with oil in a similar manner.

Perfumes for Hair Oil.

Hair oils may be perfumed as desired with perfuming oils or mixtures of oils. The following mixtures for general use are recommended:

Fine Orange Flower Perfume. Oil of neroli bigarade 1 part, oil of neroli petit grain, oil of jasmine, fatty, 10 parts. Mix them.

Rose Oil Perfume, cheap. Oil of bergamot 4 ounces, oil of citronella 1 ounce, oil of cassia or cinnamon 3 drachms, oil of cloves $\frac{1}{2}$ drachm. Mix them. Of this from 3 to 6 drachms or more may be used for each pint of oil. If finer perfumes are desired without regard to expense, from 1 to 3 ounces of bulk perfume of any odor may be used in place of an equal quantity of alcohol in the castor oil base, or the following combinations of fatty perfuming oils etc., may be used to mix with any of the other hair oil bases. The fatty oils mentioned in the formulas are made by macerating the fresh flowers in almond or olive oil. They are imported and may be obtained of the New York jobbing houses. These perfumes can also be used for fine pomades or stick cosmetics.

Fine Rose Oil Perfume. Oil or otto of rose 2 parts, oil of rose geranium 4 parts, oil of patchouli 1 part, oil of jasmine, fatty, 10 parts; oil of tuberose, fatty, 10 parts; oil of violet, fatty, 5 parts. Mix them. This may be used as is necessary to perfume the oil, from 2 drachms to 1 ounce being used to each pint of oil.

Pomades.

Pomades for the hair are fatty preparations of the consistence of ointments. They were formerly made of beef marrow, suet, washed lard or mixtures of fats, generally perfumed and colored, but were quite liable to spoil or become rancid by standing. Since the introduction of the petrolatum it has, in this country, taken the place of other fats as a basis for pomades, as it is of about the right consistence, and never becomes rancid or deteriorates. It is therefore directed in the following formulas, but if preferred, the purified suet directed for making stick pomades may be used as a base.

Barber's Pomade. Petrolatum 16 ounces, oil of bergamot 60 minims, oil of citronella 20 minims, oil of cassia 10 minims, oil of cloves 5 minims. Melt the petrolatum and while cooling, but still liquid, add the oils and mix thoroughly. If finer perfume is desired without regard to expense the fine perfumes given under hair oils may be used.

Fine Pomades. By mixing equal parts of petrolatum with various flower pomades No. 24, and, if necessary, adding additional perfume, a great variety of fine pomades may be made, as acacia or cassia pomade, rose pomade, orange flower pomade, violet pomade etc. They may also be made by mixing petrolatum with purified suet, equal parts, and scenting with fine perfuming oils as directed for stick pomades. It is unnecessary to give detailed formulas for them.

Pomade Hongroise or Moustache Wax. White wax 1 ounce, powdered Castile soap $\frac{1}{2}$ ounce, gum arabic, powdered, $\frac{1}{2}$ ounce; rose water 1 ounce, oil of bergamot 30 minims, oil of thyme 3 drops. Dissolve the gum arabic and the soap in the rose water by gentle heat, then, having previously melted the wax, add it gradually to the mixture, stirring them constantly; while cooling add the perfume. It is usually put up in jars or pots.

Spirit Gum. For sticking on artificial moustaches or whiskers. Sandarach 2 drachms, damar 2 drachms, alcohol 1 ounce. Dissolve.

Stick Pomades or Cosmetics.

These are pomades of much firmer consistence than the foregoing, containing considerable wax, and run into sticks. They are used for the moustache and whiskers, and for making the hair stay where it is wanted.

Stick Cosmetic Base. Take 10 pounds of fresh beef suet, cut it in small pieces, pound it in a mortar and wash it thoroughly several times in pure cold water. Then put it over a fire and slowly "try it out," not allowing it to come to a boil (as that develops the disagreeable animal odor), add to it when melted $2\frac{1}{2}$ drachms powdered alum and about the same amount of salt, then let it come to a simmer, remove the scum that rises, and strain through a fine wire or muslin strainer into a deep dish partly filled with hot water. Allow it to stand 2 or 3 hours that all impure matter may settle, then remove from the dish, melt and mix 1 ounce powdered gum benzoin and $\frac{1}{2}$ pint rose water, bring to a boil and simmer for a few minutes, skimming off all that rises to the top, add to it $\frac{1}{2}$ gallon of boiling water, agitate and stir thoroughly and at last pour off into a shallow pan to cool. This makes the same kind of purified grease that is used in making perfuming pomades. It will keep for any length of time sweet and pure without becoming rancid, and is suited well for making any of the harder kinds of pomades, cosmetiques etc.

To make the stick pomade take of the purified suet thus prepared 10½ ounces, white wax or paraffin 1½ ounces. Perfumes as desired. This is sufficient to make 1 dozen 1 ounce sticks of pomade, which may be made by melting them together and running into suitable moulds.

The base may be perfumed with the mixtures of perfuming oils as given under hair oils, or as follows—the quantity of perfuming oils stated being for 12 ounces of the base. This may be variously perfumed with other ingredients, or colored brown with umber, black with ivory black or other black pigment.

Almond Cosmetic.—30 minims essential oil of almonds.

Bay Cosmetic.—30 minims oil of bay.

Cassia Cosmetic.—30 minims oil of cassia.

Orange Flower Cosmetic.—20 minims oil of neroli.

Rose Geranium Cosmetic.—30 minims oil rose geranium.

Santaline Cosmetic.—30 minims santal-wood oil, 5 drops rose oil.

Verbena Cosmetic.—20 minims oil lemon grass.

White Rose Cosmetic.—10 minims oil rose, 3 minims oil patchouly.

Ylang-Ylang Cosmetic.—10 minims oil ylang-ylang, 3 minims oil rose.

Hair Powders.

For powdering the hair white, ordinary powdered starch scented with some kind of bulk perfume is generally used. The perfume may be rubbed with a small quantity of the powder first and then with the remainder gradually added. Talcum powder also may be used.

Silver powder is made from mica, coarsely ground, and gold powder from gold colored mica or tinsel, ground or finely cut.

Hair Restoratives.

These preparations, which are designed for changing gray hair to its former natural color, have had a very extensive sale in past years, and still sell considerably. They are generally made to serve as an invigorator and dressing for the hair as well as to restore the color. They all act by the absorption of lead and sulphur, and their conversion into lead sulphide in the hair when exposed to light. It is necessary that these preparations be protected from the light. The following formulæ make preparations similar to those most popular.

Hair Renewer or Balsam.

Lead Acetate,	1½ ounces av.
Lac Sulphur, (Precipitated Sulphur),	2 ounces av.
Tincture of Cantharides,	1 fl.ounce
Glycerin,	1 pint
Alcohol,	½ pint

Oil of Citronella,	2	fl.drachms
Oil of Bergamot,	1	fl.drachm
Water, sufficient to make	1	gallon

Dissolve the oils in the alcohol, add the glycerin and tincture of cantharides and mix with the water; add the sulphur and acetate of lead.

Hair Vigor or Vitalizer.

Precipitated (Lac) Sulphur,	2	ounces av.
Lead Nitrate,	1½	ounces av.
Tincture of Cantharides,	2	fl.ounces
Glycerin,	1	pint
Alcohol,	½	pint
Oil of Lavender,	½	fl.ounce
Essential Oil of Almonds,	30	minims
Water, enough to make	1	gallon

Mix the sulphur and the lead and add to half a gallon of water, dissolve the oils in the alcohol, add the tincture of cantharides and glycerin to the mixture; then add enough water to make a gallon. The lead nitrate is to be preferred to the acetate on account of the disagreeable odor of the acetate. If the odor of rose is preferred to lavender, 3 pints of rose water may be used, the oil of lavender being omitted.

Hair Renovator.

Lead Acetate or Nitrate,	1½	ounces av.
Sodium Hyposulphite,	5	ounces av.
Glycerin,	1	pint
Alcohol,	½	pint
Oil of Lemon,	2	fl.drachms
Oil of Cloves,	½	fl.drachm
Essential Oil of Almonds,	½	fl.drachm
Rose Water,	2	pints
Water, sufficient to make	1	gallon

Dissolve the lead and sodium hypophosphite, each, separately, in 2 pints of hot water and mix the solutions; dissolve the oils in the alcohol, add 2 pints of water and rub with half an ounce of magnesium carbonate in a mortar, filter and add the filtrate to the other mixture, then add the glycerin and enough water to make a gallon.

This makes a preparation without sediment, which is much cleaner to use than those containing the precipitated sulphur. It must be kept from the light.

Hair Restorer. (Two Preparations).

The following is similar to several preparations that have been put upon the market, containing two bottles. It has no particular ad-

vantage over the Hair Vigor and Vitalizer formula, except that the bottles may be exposed to the light without causing precipitation.

No. 1 Solution.

Sodium Hyposulphite,	2 ounces av.
Rose Water,	1 pint
Water,	1 pint
Alcohol,	½ pint
Mix and dissolve.	

No. 2 Solution.

Lead Nitrate,	1 ounce av.
Glycerin,	4 fl.ounces
Distilled Water,	3 pints
Mix and dissolve.	

Apply No. 1 solution to the hair and allow to dry, then apply No. 2 solution, rubbing it in thoroughly with a hair brush.

Mrs. Allen's Hair Restorer.

From analyses of this preparation conducted separately by Wittstein and Musset, it is shown to contain sulphur, sugar of lead and glycerin, with aromatic water. The following formula very nearly corresponds with the analysis:

Lac Sulphur,	135 grains
Lead Acetate,	190 grains
Glycerin,	3½ fl.ounces
Water,	11 fl.ounces
Cologne, or Bulk Perfume,	1 ounce

Mix. This is one of the oldest and best known hair restoratives.

Shampoos.

Shampoo Liquids. Two kinds of shampoo liquids are used, the wet and dry, the former being intended to be used with a quantity of water to wash the head, and the other to be applied in small quantities and the hair rubbed until nearly dry. Of the former the two formulas are given.

Barber's Shampoo. Potassium carbonate (salts of tartar) 90 grains, ammonia water 3 fl.ounces, cologne 2 fl.ounces, water sufficient to make 2 pints. Mix and dissolve.

Clifford's Shampoo Compound. Borax 12 ounces, salts of tartar 4 ounces. Mix and dissolve 1 ounce of the mixture in 1 pint of water when wanted for use.

Dry Shampoo. Cologne 1 ounce, alcohol 2 ounces, ammonia water 3 ounces, water 12 ounces. Mix them. This is applied and the hair rubbed until the lather first formed is dry.

Egg Shampoo. Transparent soap 2 ounces, glycerin 1 ounce, white of egg 1 ounce, tincture quillaja 1 ounce, bulk perfume ½ ounce,

water sufficient to make 16 fl.ounces. Melt the soap with 8 ounces of water by the aid of heat, and when cold add the glycerin, tincture quillaja and perfume; mix the white of egg with 4 ounces of water and when completely dissolved strain it into the mixture of soap etc., add enough red coloring to give the desired color and water, if necessary, to make 1 pint, and after standing, filter.

Quillaja Sea Foam. Tincture quillaja 2 ounces, cologne or bay rum 2 ounces, water 12 ounces. Mix them. This does away with the odor of ammonia, which is objectionable to many.

Sea Foam. Bay rum 3 fl.ounces, ammonia water 3 fl.ounces, water 10 fl.ounces. Mix them.

Sea Foam. Dry Shampoo. Powdered Castile soap $\frac{1}{2}$ ounce, potassium carbonate (sal tartar) $\frac{1}{2}$ ounce, water 8 ounces, tincture soap bark 1 ounce, bay rum 8 ounces, distilled extract witch hazel 2 ounces, alcohol 4 ounces. Mix, dissolve and apply to the hair, rub in then with a towel until dry.

HAIR TONICS.

Katharion Hair Tonic.

Castor Oil,	4 fl.ounces
Tincture Cantharides,	4 fl.drachms
Tannic Acid,	30 grains
Oil Citronella,	30 minims
Oil Bergamot,	30 minims
Oil Cloves,	40 minims
Oil Lavender Flowers,	60 minims
Oil Rosemary,	60 minims
Alcohol,	12 fl.ounces
Mix.	

Hair Tonic.

Tincture of Cantharides,	4 fl.drachms
Ammonia Water,	1 fl.ounce
Cologne,	2 fl.ounces
Glycerin,	4 fl.ounces
Borax,	2 drachms
Bay Rum,	4 fl.ounces
Water,	4 fl.ounces

Mix. This is an excellent tonic, shampoo or dressing.

Hair Lotion or Wash.

To prevent the hair from falling out, and promote its growth.

Tincture Cantharides,	2 fl.drachms
Ammonia Water,	1 fl.drachm
Glycerin,	1 fl.ounce
Bay Rum,	5 fl.ounces
Rose Water,	10 fl.ounces

Mix them. This is applied as a lotion for baldness etc., also as a dressing.

Hair Food. For invigorating the hair, curing dandruff, baldness etc. Tincture jaborandi 1 fl.ounce, resorcin 60 grains, thymol 5 grains, tincture cantharides 2 fl.drachms, glycerin $\frac{1}{2}$ fl.ounce, juniper tar (oil of cade) 1 fl.drachm, cologne 1 fl.ounce, Cologne spirit 5 fl.ounces, water 9 fl.ounces, caramel coloring, sufficient. Dissolve the solids in the alcohol and add the remaining ingredients, lastly the water and, after standing, filter clear.

Imperial Hair Tonic. Quinine sulphate 60 grains, tincture cantharides 2 fl.ounces, tincture orris root 2 fl.ounces, good cologne 8 fl.ounces, Cologne spirit 8 fl.ounces, oil of bergamot 20 drops, oil of angelica 10 drops, oil of cassia 5 drops, oil of rose geranium 15 drops, water 8 fl.ounces, tincture cudbear sufficient to color bright red. Dissolve the oils and the quinine in the cologne and Cologne spirit and add the tinctures, coloring and water; filter clear.

The coloring may be added as desired to make a bright red color. Instead of the oils for perfuming, 1 ounce or more of good bulk perfume may be used, but the cologne, if good, makes about enough perfume. This is similar to quinine hair tonic, of Pinaud.

Peerless Hair Tonic. Quinine sulphate 80 grains, zinc sulphate 20 grains, tincture cantharides 4 fl.drachms, tincture capsicum 2 fl.drachms, oil of lavender flowers, oil of rosemary, oil of cinnamon, each, 24 minims; bay rum 20 fl.ounces, alcohol 12 fl.ounces. Dissolve the salts and the oils in the alcohol, add the tinctures, then the bay rum, after standing, filter clear.

ICES AND JELLIES

As Toilet Preparations.

The most familiar preparation of this kind is camphor ice, which is considerably used for sun-burn, tan, chap, chafe etc. Cold cream is a softer preparation much used for the same purpose. Formulas for both of these have been given under other headings, and a few only will be given here.

Camphor Ice with Glycerin. Paraffin or white wax 4 ounces, white petrolatum or washed lard 12 ounces, camphor 3 ounces, glycerin 3 ounces, oil of bitter almonds 20 minims, oil of rose 5 minims, oil of cloves 5 minims. Melt the paraffin and petrolatum together and remove from the fire, add the camphor in powder and keep warm until the camphor is dissolved, then strain, and while cooling add the glycerin and perfuming oils; beat well together until it is cool enough to set, and run into molds or a flat pan on ice. It may then be cut up as desired.

Carbolated Camphor Ice. This may be made by adding 1 ounce of carbolic acid to the ingredients of the formula for Camphor Ice.

Carbolated Camphor Ice with Glycerin. This may be made by adding 1 ounce of carbolic acid to the ingredients of the formula for Camphor Ice with Glycerin.

Glycerin Honey or Jelly. Solidified Glycerin. Transparent soap 4 ounces, water 6 ounces, glycerin 12 ounces, oil of bergamot 20 minims, oil of cloves 10 minims, oil of bitter almonds 5 minims. Cut the soap in thin shavings and dissolve in an evaporating dish with the water, when dissolved add the glycerin and boil for 1 hour until the vapor of the water no longer rises, and the liquid measures only 1 pint; when nearly cool stir in the essential oils and pour into a shallow evaporating pan or boxes designed for the preparation. The perfume may be varied to suit, by using other combinations. This makes transparent jelly.

Glycerin Jelly. Another method of making this is as follows: White Castile soap, in powder, 140 parts; pure glycerin 210 parts, oil of almonds, expressed, 1260 parts for winter use, or 1680 parts for summer use, oil of bergamot 8 parts, oil of rose 2 parts, oil of lavender 4 parts. Mix the powdered soap and glycerin in a mortar, then add the oil of almonds and incorporate it by triturating rapidly and add the perfume. This jelly is not transparent.

Camphorated Glycerin Honey or Jelly. This may be made by adding $\frac{1}{2}$ ounce of powdered camphor to the glycerin honey while warm.

Carbolated Glycerin Honey. This may be prepared by adding carbolic acid $\frac{1}{4}$ ounce to the glycerin honey while warm, the same may also be added to the camphorated glycerin honey if desired.

Glycerin Ice. Gelatin 2 ounces, water 6 ounces, glycerin 14 ounces, perfuming oils to suit. Dissolve the gelatin in the water by the heat of a water-bath, add the glycerin previously heated, boil until only 1 pint remains and strain; while cooling incorporate the perfumes and pour into shallow tins, this may be colored red or other color if desired. It resembles ice. To apply it the skin should first be moistened with water and the cake rubbed over it.

Glycerin Jelly. Gelatin 1 ounce, boric acid, in fine powder, 2 drachms; water 1 pint, bulk perfume 1 or 2 ounces. Soak the gelatin in the water until soft, then heat until dissolved, add the glycerin and boric acid and strain; while cooling add the perfume and mix thoroughly. This is a thin or soft jelly and should be put up in pots or jars. It is an excellent preparation for chaf, chafe and roughness of the skin.

Arnica Jelly. This may be made by adding 4 fl.ounces of tincture of arnica to the solution of gelatin and boiling the solution until only 1 pint remains, then adding the glycerin etc., as before. The firm arnica jelly may be made by adding tincture arnica 2 ounces, to each pint of any of the former preparations before adding the glycerin etc., other substances may be combined with the jellies in the same manner.

For perfuming these jellies or other similar preparations the synthetic perfumes may be used instead of the oils directed.

LIP SALVES AND COSMETICS.

Lip salves are used for softening the lips, preventing them from cracking, curing sores etc., and are sometimes employed to impart a color to the lips. The following formulas will suffice. Lip salves are usually put up in small metal, glass or porcelain boxes.

Lip Salve. Oil of sweet almond 4 ounces, white wax, spermaceti, each, 1 ounce; essential oil of almonds, oil of bay leaves, each, 15 drops. Melt the wax and spermaceti together, add the almond oil and while cooling the perfuming oils, and stir constantly until cold.

Lip Salve. The foregoing preparation is liable to deteriorate by age, this one will keep indefinitely and is to be preferred. Petrolatum 8 ounces, white wax or paraffin $1\frac{1}{2}$ ounces, tannin 1 drachm, oil of lavender, oil of bergamot, each, 1 drachm; oil of rose geranium 2 drachms. Melt the petrolatum and wax together and add the tannin; while cooling add the oils and stir until cold.

Coral Lip Salve. This may be made by adding to either of the foregoing formulas 10 grains of carmine for each ounce of the lip salve. It is best reduced to a fine powder in a mortar and then rubbed with a small portion of the salve to a smooth mass, the remainder being gradually mixed with it.

LOTIONS

As Toilet Preparations.

Lotions as toilet preparations are intended to whiten and soften the skin, remove pimples, tan, freckles, sun-burn etc. The milks are also included under this heading, as they are employed for similar purposes.

Acne Lotion. Several forms of Acne or pimple disease are common. For a general lotion use the following: Mercuric chloride 30 grains, resorcinol $\frac{1}{2}$ ounce, spirit of camphor 1 ounce, ether 1 ounce, alcohol 5 ounces, glycerin 1 ounce. Dissolve the salts in the alcohol, add the ether and camphor spirit and then the glycerin, shaking them well together. If the pustules are materated apply the lotion with a brush to the pustules; if general pustular roughness apply with a soft sponge. Also see pimple lotions.

Anti-Freckle Lotion. Mercury bichloride 12 grains, hydrochloric acid 3 fl.drachms, bitter almonds $1\frac{1}{2}$ ounces, glycerin 1 ounce, tincture benzoin 2 drachms, orange flower water sufficient to make a pint. Dissolve the mercury bichloride in 3 ounces of the orange flower water, add the hydrochloric acid and set aside. Blanch the almonds and bruise them to a paste in a mortar with the glycerin and add sufficient orange flower water to make about 12 ounces of cream or

milk of almonds; add to this the tincture of benzoin, drop by drop, rubbing them well together, then add the solution of mercury bichloride and enough orange flower water to make a pint. Strain the whole forcibly through a cheese-cloth strainer to remove the coarser particles of almond.

Comedones Lotion. Blackheads Lotion. Ether, alcohol, glycerin, each, 4 parts; gasoline, ammonia water, each, 1 part; bulk perfume $\frac{1}{4}$ part. Mix them. Apply at night after bathing the parts well with hot water. It must be well shaken before using. A few applications of this remedy will dissolve the sebaceous deposits known as blackheads, and by daily friction and massage they will be entirely removed in a short time.

Face Lotion. Bitter almonds, sweet almonds, each, 1 ounce; oil of almonds 1 ounce, spermaceti $\frac{1}{2}$ ounce, borax, in powder, $\frac{1}{4}$ ounce; glycerin 4 ounces, orange flower or rose water sufficient to make a pint. Blanch the almonds and reduce them to a uniform paste by beating them in a mortar and then rubbing with the glycerin. Rub the spermaceti in another mortar, previously warmed, with the oil of almonds and beat until dissolved. Dissolve the borax in half a pint of the perfumed water, and having gradually added the warmed oil solution to the emulsion of almonds in the mortar, add the solution of borax and shake them well together; then add enough of the perfumed water to make a pint and strain the mixture through coarse cheese-cloth to remove larger particles of almonds.

Freckle Lotion. Sulpho-carbolate of zinc $\frac{1}{4}$ ounce av., glycerin 3 ounces av., alcohol 2 fl.ounces, orange flower water 3 fl.ounces, rose water sufficient to make a pint. Mix, dissolve and filter.

Glycerin Lotions. Quite a variety of preparations are sold as glycerin lotions, the most common being Rose Water and Glycerin, equal parts of each, mixed; or 2 parts of rose water to 1 of glycerin. Lime Juice and Glycerin, usually made with equal parts of lime juice, glycerin and rose water, is also a favorite application for tan and freckles, and is sometimes applied to the hair. Other waters may be used in place of rose water; cherry laurel or orange flower water making fine preparations.

Imperial Lotion. Spirits camphor 2 fl.drachms, carbolic acid 2 drachms, alum, in powder, 2 drachms; glycerin 10 fl.ounces, distilled witch hazel 10 fl.ounces, essence rose q. s. Mix, dissolve and filter clear. The essence rose may be made by dissolving 5 drops oil of rose in 1 ounce of Cologne spirits. This amount should be used for the above quantity. One ounce bulk perfume may be used instead.

Imperial Moth or Freckle Lotion. Solution of hydrogen dioxide 8 ounces, distilled witch hazel 16 ounces, orange flower or rose water 8 ounces. Mix them. The solution of hydrogen dioxide or peroxide may be the U. S. P., Marchand's or any other reliable make. This

is an excellent preparation for moth and freckles, with which so many ladies are afflicted.

Imperial Pimple Lotion. Carbolic acid 1 drachm, borax 4 drachms, glycerin 2 fl.ounces, tannin 2 drachms, alcohol 3 fl.ounces, rose water 10 fl.ounces. Mix and dissolve. Apply night and morning.

Moth and Freckle Lotion. Bichloride of mercury 60 grains, ammonium chloride 240 grains, alcohol 3 fl.ounces, rose or orange flower water 3 fl.ounces, water 10 fl.ounces. Rub the corrosive sublimate to a fine powder and dissolve the ammonium chloride in the water, add the orange flower or rose water, mix with the alcoholic solution and, after standing a day or two, filter. This may be applied once or twice a day with a soft sponge or linen cloth and will quickly remove moth or freckles, tan etc.

Peerless Eczema Lotion. Resorcinol 1 ounce, mercuric chloride 20 grains, glycerin 4 fl.ounces, alcohol 4 fl.ounces, cologne 2 fl.ounces, water 6 ounces. Mix the alcohol and cologne and dissolve the salts in the mixture; mix the glycerin and water and add gradually to the alcoholic solution; let stand and filter clear. This is an excellent preparation for the scaly eruption so common on the face, also for any eczema on any part of the body.

Pimple Lotion. Lac sulphur, glycerin, precipitated chalk, cherry laurel water, alcohol, each, 4 parts. Mix them thoroughly. Apply at night after bathing the face with warm water with friction, and allow to dry on. A mask may be worn to prevent rubbing off. Shake before using.

Wrinkle Lotion. Aluminum sulphate 4 drachms, milk of almonds 6 ounces, rose water 25 ounces. Mix, dissolve and strain. This is an excellent lotion to apply for removing wrinkles. It should be applied at night, well rubbed in and allowed to dry on the skin.

Milk of Almonds. Bitter almond, sweet almond, each, 1 ounce; alcohol, glycerin, each, 3 ounces; oil of bitter almonds 30 minims, water sufficient to make a pint. Blanch the almonds, beat to a paste, add the glycerin, dissolve the oil of almonds in the alcohol and add; then add enough water to make a pint and strain through cheese-cloth to remove the coarser particles of the almond. This may be made by mixing $1\frac{1}{2}$ ounces expressed almond oil with 8 ounces of water, in which $\frac{1}{2}$ ounce of borax has been dissolved and adding to the mixture 3 ounces of glycerin and 3 ounces of alcohol in which 10 drops of essential oil of almond is dissolved, and enough water to make 1 pint. It is used as a bland application for sun-burn, tan etc., also as a vehicle for other medicinal substances.

Milk of Roses. This may be made in the same manner as milk of almond, except that oil of rose 15 drops, instead of oil of almond is used with the other ingredients. Another formula is sweet almond, blanched, 4 ounces; rose water 1 pint, alcohol 2 ounces, oil of rose 20

minims, white wax, spermaceti, Castile soap, each, 2 drachms. The almonds are blanched and beaten with rose water; the wax, soap and spermaceti are melted together by water-bath and the almond emulsion is gradually mixed by rubbing in a warm mortar with the melted ingredients. The alcohol in which the oil of rose is dissolved is then added to the mixture. By using pistachio nuts instead of almonds pistachio cream may be made.

MASSAGE PREPARATIONS.

The process of massage is now much employed for removing wrinkles and otherwise beautifying the face, and a number of creams, ointments and pomades are employed. The following are representative preparations:

Imperial Greaseless Massage Paste. Calcined magnesia 4 ounces, precipitated chalk 4 ounces, glycerin 4 ounces, water 4 ounces; perfume, as desired. Mix the powder and rub with the glycerin and perfume in a mortar, then add the water and mix them intimately. If a pink color is desired use a little carmine solution for the required shade. The skin should be moistened when this is applied.

Massage Cream. Tragacanth, in powder, 1 ounce, rose water 12 ounces, glycerin (by measure) 1 ounce, zinc oxide 160 grains. Mix the tragacanth with the rose water and allow to swell for 24 hours, then strain through cheese-cloth with pressure; mix with the glycerin and rub with the zinc oxide in a mortar. A little perfuming oil or extract may be added while rubbing in the mortar.

Massage Ointment. Lanolin 3 ounces, petrolatum 3 ounces, borax, in fine powder, 16 grains; zinc oxide 30 grains, tincture of benzoin 10 drops. Rub them together in a mortar until thoroughly mixed.

Massage Paste. Alum, in fine powder, 1 ounce; tannin, in fine powder, 1 ounce; glycerite of starch 8 ounces. Rub them together and perfume if desired.

Massage Paste for Red Nose and Blotches. Cacao butter 4 parts, hazel nut oil 10 parts, citric acid $\frac{1}{2}$ part, white precipitate $\frac{1}{3}$ part, perfume to suit. Melt the cacao butter and oil together, rub the citric acid and white precipitate together and incorporate with the melted mass while cooling.

Massage Pomade. Lanolin 1 ounce, white petrolatum 1 ounce, tannin 3 drachms. Mix them well together in a mortar and perfume.

If these massage preparations are to be put up they may be perfumed with rose, benzoin, bitter almond or other perfumes, and colored flesh tint with carmine.

Peerless Massage Paste. Kaolin, acid washed, 4 ounces; precipitated chalk 4 ounces, glycerin 4 fl.ounces, water 1 ounce; perfume, as desired. Mix the kaolin and the chalk and rub with the glycerin, water and perfume in a mortar or, for large quantities, grind through

a paint mill. The skin should be moistened when this is applied. This may be mixed with tragacanth massage cream or with the massage paste, equal parts, to produce a paste that will roll off when manipulated by massage.

Peerless Skin Food. Dry stearin 4 ounces, cerasin or white wax 2 ounces, precipitated chalk 2 ounces, zinc oxide 1 ounce, oil rose geranium or rhodinol II. 20 minims, oil bitter almonds 5 minims, liquid paraffin 12 ounces. Melt the stearin and cerasin (or wax) with the liquid paraffin; mix the chalk and zinc oxide intimately and sift into the melted mixture. Stir while cooling and when nearly solid add the perfuming oils and incorporate thoroughly. This may be used as a massage cream and for softening the skin and giving it tone and texture. It may be applied and dusted with powder. Other perfumes may be used if desired.

NAIL COSMETICS.

Powder and ointment for the nails are sometimes called for as toilet preparations, and may readily be made by druggists.

Nail or Manicure Powder. This is for polishing, smoothing or cleaning the nails. Pumice stone, in powder, 8 ounces; powdered French chalk 2 ounces, carmine, in No. 40 powder, 1 drachm; bulk perfume, rose or violet, $\frac{1}{2}$ ounce.

Nail or Manicure Salve. This is for softening the nails, curing hang nails etc. Petrolatum 1 ounce, Castile soap, in powder, 1 drachm; oil of bergamot 10 drops, or other more expensive perfuming oils, if desired. Mix them thoroughly. This is to be applied at night and the fingers covered with gloves.

PERFUMES.

Handkerchief extracts or "perfumes" as they are popularly called, are kept by nearly all druggists and constitute quite an important part of their trade. The limited space allotted in this volume for this subject will only allow brief mention of the substances used, an outline of the manner of making and a few formulas for the most popular odors. The introduction of synthetic odors has greatly simplified the making of perfumes and it is now possible for druggists with but a small outlay to make very satisfactory bouquets. The preparations required for making perfumes in the old way will first be considered and then the synthetic perfumes will be introduced.

The following extracts, essences etc., are required for making the old line of perfumes, and many of them are used in making the new. The processes are simple and adapted to the conveniences always at hand in a well regulated pharmacy.

CLASS A.**Extracts of Flowers from Pomades.**

The pomades used for making these extracts are mostly prepared in France, by Eufleurage, and may be obtained of perfumers and importing jobbers. They cost from \$2.00 to \$2.50 per pound, some of them, as violet, costing much more.

To make Triple Extracts from Pomades. First. Take equal parts by weight of the required pomade and the strongest Cologne spirit (deodorized alcohol). Divide the pomade into three equal parts, and put one part (one-third) of the pomade and all of the Cologne spirit in a glass or copper jar that will hold double the quantity, and can be stopped air-tight. (An ordinary glass fruit jar is just the thing for small quantities).

Put the jar in a water-bath and keep at only a moderate heat (just sufficient to keep the pomade melted) for three or four days, agitating frequently, then remove from the water-bath, cool, shake occasionally while cooling to granulate the fat, then pour the liquid extract from the pomade. This product may be termed Single Extract.

Second. Take another part (one-third) of the fresh pomade and macerate in the same manner as before with the extract which has been obtained from the first maceration. This product may be termed the Double Extract.

Third. Take the remaining third of the fresh pomade and macerate it in the same manner as before, with the product of the previous macerations.

When this maceration is completed, surround the jar containing the pomade and extract with ice that all particles of fatty matter may be congealed. When thoroughly cold, pour off the extract, straining through a little cotton-wool into bottles, and keep closely stopped.

This constitutes the Triple Extract, and is the finest and strongest extract that can be obtained from the pomades.

The pomade that remains after the extract has been poured off may again be treated in a similar manner with fresh Cologne spirit, and the product will be a very fine extract but not so strong as the first. It will perhaps, about correspond to the Single Extract, and may be used for another batch, or for making Colognes or cheap Perfumes.

After the pomade has been thus successively treated, it is called Washed Pomade, and is very good for making cosmetics and pomades for the hair.

The basic extracts made in the manner above described are

Triple Extract Cassie or Acacia. From cassie pomade.

Triple Extract Jasmine. From jasmine pomade.

Triple Extract Rose. From rose pomade.

Triple Extract Tuberose. From tuberose pomade.

Triple Extract Violet. From violet pomade.

Others may be made in the same manner.

The extracts as thus prepared are used only for combinations. They require something to give them permanence before putting up for sale, and handkerchief extracts of the same name contain such additions.

CLASS B.

Essences from Essential Oils.

These are simply solutions of the best quality of ottos or essential oils, in the strongest Cologne spirit (deodorized alcohol).

They are chiefly used in combining with other perfumes, and they should be kept on hand, prepared in small quantities, ready for use.

Essence Almond. Oil of bitter almonds 1 part, Cologne spirit 9 parts.

Essence Bergamot. Oil of bergamot 1 part, Cologne spirit 9 parts.

Essence Cassia. Oil of cassia 1 part, Cologne spirit 9 parts.

Essence Cloves. Oil of cloves 1 part, Cologne spirit 9 parts.

Essence Lavender. Oil of lavender, (English), 1 part; Cologne spirit 9 parts.

Essence Lemon. Oil of lemon 1 part, Cologne spirit 9 parts.

Essence Lemon-grass or Verbena. Oil of lemon-grass 1 part, Cologne spirit 15 parts.

Essence Linaloe. Oil of linaloe 1 part, Cologne spirit 9 parts.

Essence Neroli. Oil of neroli (bigarade) 1 part, Cologne spirit 15 parts.

Essence Orange. Oil of orange peel 1 part, Cologne spirit 9 parts.

Essence Patchouly. Oil of patchouly 1 part, Cologne spirit 20 parts.

Essence Rose. Oil of rose (best Kissanlik), 1 part; Cologne spirit 60 parts.

Essence Rose Geranium. Oil rose geranium 1 part, Cologne spirit 20 parts.

Essence Rosemary. Oil of rosemary 1 part, Cologne spirit 9 parts.

Essence Santal. Oil of santalwood (true) 1 part, Cologne spirit 60 parts.

Essence Ylang-Ylang. Oil ylang-ylang 1 part, Cologne spirit 60 parts.

CLASS C.

Extracts or Tinctures of Odorous Substances.

These are extracts or tinctures of odorous substances that are used in perfumes, chiefly to give permanence to the more volatile odors. They should be kept on hand ready to combine as desired. Most of them require long maceration to extract their odorous principle.

Extract Ambergris. Ambergris 1 part, Cologne spirit 60 parts.

Rub the ambergris fine and macerate for 30 days in a warm place in a tightly stopped bottle.

Extract Angelica. Angelica root, true, 1 part; Cologne spirit 4 parts. Rub the angelica root to a coarse powder and macerate for 30 days with the Cologne spirit. Press out and filter.

Extract Civet. Civet 1 part, Cologne spirit 60 parts. Macerate for 30 days in a tightly stopped bottle in a warm place.

Extract Musk. Fine grain musk 2 parts, potassium carbonate 1 part, Cologne spirit 120 parts. Macerate for 30 days in a warm place in a tightly stopped bottle.

Extract Musk Root or Sumbul. Sumbul root 1 part, Cologne spirit 4 parts. Reduce the musk root to a coarse powder and macerate for 30 days. Express and filter.

Extract Musk Seed or Ambrette. Musk seed 1 part, Cologne spirit 4 parts. Macerate for 30 days. Express and filter.

Extract Orris or Violet. Orris root 3 parts, Cologne spirit sufficient to make 4 parts. Reduce the orris root to a coarse powder, and macerate for 30 days with 4 parts of Cologne spirit, then transfer to a percolator and percolate, adding fresh spirit through the percolator until 4 parts are obtained. This is much used as a substitute for violet.

Extract Tonqua. Tonqua beans 1 part, Cologne spirit 9 parts. Cut the beans fine, crush and macerate for 30 days.

Extract Vanilla. Vanilla 1 part, Cologne spirit 9 parts. Cut the vanilla in fine pieces and rub with white sand to a coarse powder, add the Cologne spirit and macerate for 30 days in a warm place.

Extract Wild Ginger. Wild ginger (Canada snake root) 1 part, Cologne spirit 4 parts. Reduce the drug to a coarse powder and macerate for 30 days in the Cologne spirit. Express and filter.

Balsam Peru, tolu, benzoin, styrax and some other odoriferous bodies are also used in perfumes, but no especial extracts need be prepared from them, 1 part to 9 parts of Cologne spirit being used to make an extract of tincture.

The druggist will, of course, make up these preparations in such quantities as his trade demands, but it is well to have some of each kind on hand.

The citrine oils, bergamot, lemon and orange, change quickly if not dissolved in spirit, and it will be found advantageous to dissolve these while fresh, in the Cologne spirit, and keep them in this way.

ODORS OF FLOWERS.

(Handkerchief Extracts).

Having now prepared the elements, as they may be termed, of perfumery (Classes A, B, and C), the druggist may prepare any combination that may be desired. The formulas which follow are for those which have had the greatest sale on the market, and which time

has demonstrated to be good and salable perfumes. There may be, of course, as many combinations of odors as there are stars in the heavens; but it is not best to encourage a multiplicity of odors, but rather a familiarity with a few good ones, which will soon come to be favorites with the customers of the druggist.

Since the introduction of bulk perfumes many old and favorite odors have gone out of use, and many new ones come in. No standard has yet been established for many of the newly-named perfumes, and they are put up as the fancy of the fabricateur and the harmony or odors may direct.

The formulæ which follow make only the best grade or quality of perfumes. If the druggist desires to make cheaper goods, any of these may be diluted with Cologne spirit to meet the desired cost. And in fact this is much better than to try to make them cheaper by using inferior material, because, although they may be weak, they will preserve their purity and delicacy of odor.

For other combinations our readers are referred to more elaborate works on the subject, and to the published formulas from reliable sources.

The essences, extracts etc., which are directed to be used in the formulas are those which are given in the foregoing classes.

Essence Bouquet. Esprit de Bouquet. Essence rose 8 parts, essence lemon 1 part, essence bergamot, extract orris, each, 4 parts; extract ambergris, essence santal, each, 1 part. Mix.

Extract Frangipanni. Essence neroli, essence rose, each, 2 parts; essence santal, essence cassia, essence rose geranium, each, 1 part; extract musk, extract ambergris, extract civet, each, 1 part; triple extract tuberose, triple extract orange flowers, each, 2 parts; Cologne spirit 5 parts. Mix.

Extract Ilang-Ilang or Ylang-Ylang. Essence ylang-ylang 8 parts, essence of rose 2 parts, extract orris 2 parts, triple extract jasmine, extract musk, essence orange, each, 1 part. Mix.

Extract Jockey Club. Triple extract rose, extract tuberose, each, 4 parts; triple extract cassie, triple extract jasmine, each, 2 parts; extract orris 3 parts, extract ambergris, extract civet, each, 1 part; essence of rose 2 parts, Cologne spirit 5 parts. Mix.

Extract Lily of the Valley. Triple extract tuberose 8 parts, triple extract jasmine 1 part, triple extract orange flower, triple extract cassie, each, 2 parts; triple extract rose 4 parts, essence ylang-ylang 1 part, essence almonds $\frac{1}{4}$ part, extract vanilla 3 parts, Cologne spirit 5 parts. Mix.

Extract Mary Stewart. Triple extract cassie 1 part, triple extract rose 3 parts, triple extract tuberose 2 parts, essence rose 3 parts, essence ylang-ylang 2 parts, essence rose geranium 2 parts, essence orange $\frac{1}{4}$ part, extract orris 2 parts, extract musk 1 part, extract am-

bergris 1 part, tincture benzoin, extract tonqua, each, $\frac{1}{4}$ part; Cologne spirit 5 parts. Mix.

Extract Musk. Extract musk 10 parts, extract civet, extract ambergris, extract musk seed, each, 4 parts; essence rose 3 parts, extract wild ginger 1 part, Cologne spirit 5 to 20 parts, according to strength desired.

Extract Night Blooming Cereus. Triple extract rose 8 parts, triple extract orange flower 2 parts, essence neroli 2 parts, extract vanilla 2 parts, extract orris 3 parts, extract musk, extract civet, each, 1 part; essence almond $\frac{1}{10}$ part, tincture benzoin $\frac{1}{20}$ part. Mix.

Extract Ocean Spray or Sea Breeze. Triple extract jasmine, triple extract cassie, each, 4 parts; triple extract rose 6 parts, essence bergamot, essence lavender, each, 3 parts; essence santal 1 part, extract ambergris, extract civet, each, 1 part; Cologne spirit 5 parts. Mix.

Extract Patchouly. Essence patchouly 8 parts, essence rose, essence rose geranium, each, 2 parts; Cologne spirit 4 parts. Mix.

Extract Stephanotis. Triple extract cassie, triple extract tuberose, each, 4 parts; triple extract jasmine 2 parts, essence rose 3 parts, extract musk, extract tonqua, essence neroli, each, 2 parts; extract orris 8 parts, extract wild ginger 1 part, tincture benzoin 1 part, Cologne spirit 5 parts. Mix.

Extract Upper Ten. Triple extract rose, triple extract jasmine, triple extract violet (or extract orris), each, 6 parts; extract musk 4 parts, Cologne spirit 6 parts. Mix.

Extract Wild Olive. Triple extract rose 8 parts, triple extract jasmine, triple extract violet, each, 4 parts; triple extract cassie 2 parts, essence rose 4 parts, essence ylang-ylang 2 parts, extract musk, essence ambergris, each, $\frac{1}{2}$ part, Cologne spirit 5 parts. Mix.

Extract White Rose. Triple extract rose, triple extract violet (or extract orris), essence rose, each, 4 parts; triple extract jasmine 2 parts, essence patchouly 1 part. Mix. This may be diluted with 4 parts of Cologne spirit if desired.

Extract Violet. (Finest). Triple extract violet (from pomade) 16 parts, triple extract cassie 3 parts, extract orris 4 parts, tincture tolu 1 part, vanilla 1 part, Cologne spirit 6 parts. Mix.

Extract Violet. (Good). A good extract of violet, such as is ordinarily sold, may be made with triple extract cassie 2 parts, triple extract rose, triple extract tuberose, each, 1 part; extract orris 6 parts, essence almond $\frac{1}{20}$ part, tincture tolu 1 part, Cologne spirit 3 parts. Mix.

The formulæ given for handkerchief extracts are merely sample formulas representative of combinations that are popular on the market. A great variety of other odors by various names are sold, and may be made by druggists by combining various essences, extracts etc.

SYNTHETIC PERFUMES.

The preparation of artificial or synthetic perfumes has lately been adopted by many manufacturers, and has attracted the attention of druggists and others who are interested in putting up, as far as is consistent, their own preparations for which there is a ready sale. The introduction to the trade of concentrated synthetic bodies for the preparation of these perfumes makes it possible, with a small outlay, to prepare quite a complete line of these products, which sell readily and bring a good profit.

In the formulas which follow the synthetic bases are first given, and then the formulas for a few of the most popular odors. It will be observed that in the formulas the synthetic bodies are often combined with the extracts and essences for which formulas are given under the regular perfumes.

Amygdalol. Benzaldehyde. An artificial oil of bitter almonds is prepared by the action of chlorine upon hot toluene. Benzyl chloride is first produced; this is distilled with lead nitrate and water in an atmosphere of carbon dioxide gas, the product being benzaldehyde, which is identical with oil of bitter almonds. This is used in the same manner as oil of bitter almonds in perfumes and, being much cheaper, has almost superseded the genuine essential oil of bitter almonds. Its solubility and other characteristics are similar to the genuine oil.

Artificial Musk. Trinitrobutyltoluene. This is prepared from tertiary butyltoluene by adding it slowly to five times its weight of a cold mixture of concentrated nitric and sulphuric acids, and afterwards heating the mixture 8 or 9 hours on a water-bath. It is then washed with hot alcohol, the alcoholic solution concentrated and the trinitrobutyltoluene crystallizes in yellowish-white needles insoluble in water, but soluble in alcohol and ether. A tincture may be prepared by dissolving 1 drachm of the crystals in 1 ounce of alcohol. This has the odor of musk, and is used in synthetic perfumes as a fixing ingredient.

Coumarin or Cumarin. $C_9H_6O_2$. The odorous principle of tonka beans, the fruit of *Dipterix odorata*, a large tree growing in Guinea. True coumarin may be obtained by heating the powdered beans for a long time with an equal bulk of 85% alcohol, pouring off the liquid and again treating in the same manner with an equal bulk of fresh alcohol at a low degree of heat and pouring the residue upon four or five times its volume of cold water, collecting the precipitate, dissolving in boiling water and filtering through a wetted filter which retains the fatty matter. The coumarin in the filtered liquid deposits upon cooling and may be further purified by redissolving and filtering through animal charcoal.

Coumarin is also obtained from the common white clover, melilot; from *liatris odoratissima*; and is prepared synthetically by heating

salicylic aldehyde with sodium acetate and glacial acetic acid, or by the interaction of phenol and malic acid.

Natural coumarin in small, silky needles, soft to the touch, while the artificial is usually in crystals somewhat resembling broken rock-salt. The former, although much more expensive, has a stronger odor, and is preferable for making extracts and perfumes.

It is considerably used in making perfumes, powders and sachets, and as an ingredient in vanilla flavoring extract.

Heliotropin. Fiperonal. This is obtained by acting upon piperin by boiling it for 24 hours in a closed vessel with an equal weight of potassa and 5 parts of alcohol, the piperin is then converted into potassium piperate. This is then dissolved in 40 to 50 parts of hot water, and the hot solution mixed, with constant stirring, with a solution prepared with potassium permanganate and double the quantity of potassium piperate taken, in hot water. A precipitate forms, which is to be washed repeatedly with hot water until the washing no longer have the odor of heliotrope. The washings are then mixed and distilled. The first portions of the distillate contain most of the heliotropin, which upon cooling separates in crystals. The last portions of the distillate contain a little heliotropin which may be obtained by adding ether, which dissolves it and upon evaporating the ether it crystallizes. Chemically heliotropin is the aldehyde of piperonylic acid. It is much employed in preparing synthetic perfumes. It is soluble in about 20 parts of alcohol, slightly soluble in vegetable oils and glycerin, but nearly insoluble in water. Two varieties of heliotropin may be had from manufacturers, the amorphous and the crystalline. The former is of much finer odor but less soluble; the latter is soluble in 5 parts of alcohol or in about 15 parts of vegetable oil.

Hyacinthol. Terpeneol. When terpin or terpin hydrate are boiled with sulphuric, phosphoric or glacial acetic acids, a mixture of terpinenes consisting of terpinene, terpinolene, dipentene and an alcohol termed *terpincol*, $C_{10}H_{18}(OH)_2$, are obtained. The mixed product is called Terpinol, and the alcohol, terpeneol, is separated from it by a complicated process. It is a thick, colorless liquid, having a pleasant hyacinthine odor, and is now extensively used in producing perfumes.

Ionone. Artificial Violet. $C_{13}H_{20}O$. This was first made by Tiemann and Krüger by the interaction of acetone, citral and baryta-water. By this interaction a ketone, pseudoionone, is produced, which upon treatment with diluted sulphuric acid is converted into an isomeric ionone. This is a liquid, sp. gr. 0.925 at 20°C. (68°F.). As its odor is so very powerful, it is mainly furnished as a 10% solution in cologne spirit. To make the Violet Triple Extrait, which is sold as perfume, 1 part of this solution should be diluted with 100 parts of Cologne spirit. When thus prepared it contains only $\frac{1}{1000}$ percent. of real ionone.

Nerolin. This is an artificial product in the form of a white, crystalline powder, used as a substitute for oil of neroli in synthetic perfumes, colognes etc., and for perfuming soaps, oils etc. It is, chemically, an ethyl ether of beta-naphthol. Soluble in 5 parts of alcohol, 50 parts of vegetable oil, 30 parts of mineral oil, 50 parts of vaseline, and but slightly soluble in glycerin and water.

Oil of Cinnamon. (Synthetic). This is produced by mixing benzaldehyde and acetaldehyde and saturating the mixture with sodium hydrate when the reaction occurs, and the synthetic oil may be separated and purified. It is also obtained from styrone. The artificial oil is considerably used by manufacturers of confectionery and perfumes, but for the making of small quantities of perfumes the commercial oil of cinnamon will suffice.

Rhodinol. True rhodinol is the oxygenated portion of oil of rose, while the solid portion or stearopten, which separates when the oil is chilled is a paraffin hydrocarbon, having no rose odor. Synthetic rhodinol is produced by a complicated process in which the true rose scent is separated from other constituents with which it is associated in several other cheaper oils, as geranium, rhodium etc., or by the action of certain agents upon citral, which is an aldehyde of geraniol. Two or three qualities of rhodinol are prepared by manufacturers, varying in strength and purity of odor; the best, which is known as Rhodinol II., being identical with oil or otto of rose after the removal of its stearopten constituent. This is soluble in about 3 parts of alcohol or vegetable oil, in about 30 parts of mineral oil, but only slightly soluble in glycerin or water. Rhodinol I. is only half the price of Rhodinol II., and is used in cheaper perfumes. Rhodinol, or its solution in some form is a constituent of many of the "bouquets" or odors prepared from the synthetic bodies.

Vanillin. $C_6H_5OH \cdot OCH_3CHO$. This is, chemically, the methyl-ether of protocatechuic aldehyde. True vanillin is obtained from vanilla beans, on which it may frequently be seen in the form of white, crystalline needles. It may be obtained by exhausting vanilla with 85% alcohol, evaporating the liquid to a soft extract, adding a little water and shaking it with ether so long as it imparts color to it, then pouring off the ethereal liquid, evaporating it at a low degree of heat, treating the residue with boiling water, filtering the aqueous solution through animal charcoal, evaporating and allowing the vanillin to crystallize.

Vanilla, however, is too expensive as a commercial source of vanillin, and it is now chiefly obtained from eugenol obtained from oil of cloves. It has also been made from coniferin, a glucoside derived from the cambium layer of the pine; from guaiacol; from benzoin; from styrax; from the sugar beet and some other vegetable substances. The artificial or synthetic vanillin has the same characteristics as the

true vanillin from vanilla beans. It is used in many compound odors, powders and sachets, as well as for making flavoring extracts. It is soluble in 5 parts of alcohol or in $2\frac{1}{2}$ parts of vegetable or mineral oil, but is only slightly soluble in water or glycerin.

Wintergreen. Methyl Salicylate. (Synthetic Oil of Wintergreen). This has been previously described in this work. It is extensively used for flavoring confectionery, syrups, chewing gum and medicinal preparations, but is little used in perfumery.

Solutions of Synthetic Bodies or Bases.

The following solutions are designed for combining to make up the different bouquets and odors of the synthetic perfumes, but they may be used in place of the similarly named Triple Extracts made from pomades in Class A, the Essences of Class B, or the Extracts of Class C, in the formulas for "Odors of Flowers," preceding the Synthetic Perfumes.

Solution Amygdalol. Amygdalol or artificial oil of bitter almonds (benzaldehyde) 1 part, Cologne spirit 9 parts. Mix and dissolve. This may be used the same as essence of almond in any perfume combinations or flavorings.

Solution Artificial Musk. Artificial musk 1 part, Cologne spirit 9 parts. Dissolve. This may be used instead of extract of musk in any of the perfume combinations. Its odor is not exactly like musk, but it is so similar to it that it may be used in place of it in mixtures of perfumes and will give complete satisfaction.

Solution Cinnamol. Artificial or synthetic oil of cinnamon 1 part, Cologne spirit 9 parts. Mix and dissolve. This may be used the same as essence of cassia in any perfume combinations or flavorings.

Solution Coumarin. Coumarin 1 part, Cologne spirit 39 parts. Dissolve. This may be used the same as extract of tonqua in any perfume combinations or flavoring.

Solution Heliotropin, Amorphous. Heliotropin, amorphous, 1 part; Cologne spirit 39 parts. Dissolve. This may be used as heliotrope perfume and in many perfume combinations.

Solution Heliotropin Crystals. Heliotropin, crystals, 1 part; Cologne spirit 9 parts. Dissolve. The odor of this solution is stronger, but less delicate than that prepared from amorphous heliotropin.

Solution Hyacinthol. (Terpineol). Hyacinthol 1 part, Cologne spirit 9 parts. Mix them. This is used in combined perfumes and as an addition to sachet powders, oils, pomades, soaps etc.

Solution Ionone. (Artificial Violet). Ionone 1 part, Cologne spirit 100 parts. Mix them. This may be used as a substitute for triple extract of violet made from the pomade, but as it is much more powerful, only 1 part should be used where 10 parts of triple extract of violet is directed. It may also be used instead of orris extract in

perfuming combinations, 1 part for 100 parts. Ionone is very expensive and is seldom bought except in the 10% solution as above.

Solution Nerolin. Nerolin 1 part, Cologne spirit 9 parts. Dissolve. This may be used the same as essence of neroli in any perfume combinations or toilet waters. It is not an exact imitation of neroli, but is very good, and has the advantage of being uniform, while oils of neroli vary greatly, and owing to their high price, are liable to mixture or adulteration.

Solution Rhodinol. Rhodinol 1 part, Cologne spirit 19 parts. Mix them. This may be used the same as essence of rose in any perfume combination or flavoring. Two qualities of rhodinol are to be had, rhodinol I., and rhodinol II., the former costs only about half as much as the latter and has more of an odor of rose geranium than the latter. For the ordinary run of perfumes, especially the combinations, the rhodinol I. answers the purpose admirably, but for high-price rose perfumes, where the purity of the rose scent is specially desired the rhodinol II. should be used. The solutions of either are made in the same proportions.

Solution Vanillin. Vanillin 1 part, Cologne spirit 10 parts. Dissolve. This solution may be used instead of extract of vanilla in perfume formulas, but as it is much stronger only 1 part should be used where 10 parts of extract of vanilla are directed. It may also be used in making flavoring extracts of vanilla, in the same proportion, that is, 1 part of the solution to make 10 parts of the extract, which is equivalent to about 1 ounce of vanillin in a gallon of extract.

SYNTHETIC ODORS OF FLOWERS.

The following synthetic odors represent most of the perfumes of this class for which there is a demand. Any variety of combinations may be made in the same general manner as is directed in the following formulæ.

Acacia. Solution hyacinthol 1 part, solution cinnamol 1 part, solution heliotropin 3 parts, solution rhodinol I. 1 part, Cologne spirit 3 parts. Mix.

Carnation. Œillet. Solution hyacinthol 1 part, solution heliotropin 2 parts, essence of cloves 1 part, solution rhodinol I. 1 part, solution nerolin 1 part, solution coumarin 1 part, Cologne spirit 3 parts. Mix.

Cyclamen. Glycina. Solution nerolin 1 part, solution coumarin 1 part, solution amygdalol 1 part, solution heliotropin 2 parts, solution cinnamol 1 part, solution rhodinol I. 1 part, Cologne spirit 3 parts. Mix.

Heliotrope. Solution heliotropin 4 parts, solution nerolin 1 part, solution rhodinol I. 1 part, solution vanillin 1 part, Cologne spirit 3 parts. Mix.

Hyacinth. Solution hyacinthol 4 parts, solution cinnamol 1 part, solution coumarin 1 part, solution rhodinol I. 1 part, Cologne spirit 3 parts. Mix.

Jacinth. Solution heliotropin 1 part, solution rhodinol I. 1 part, solution hyacinthin 3 parts, solution ionone 1 part, Cologne spirit 3 parts. Mix.

Jockey Club. Solution rhodinol I. 1 part, solution hyacinthol 1 part, solution heliotropin 2 parts, solution cinnamol 1 part, solution ionone 1 part, solution nerolin 1 part, solution artificial musk 1 part, Cologne spirit 3 parts. Mix.

Jonquil. Solution cinnamol 1 part, solution hyacinthol 1 part, solution coumarin 1 part, solution heliotropin 1 part, essence bergamot 1 part, extract angelica 1 part, solution nerolin 1 part, Cologne spirit 3 parts. Mix.

Lavendal. Essence lavender 4 parts, solution heliotropin 1 part, solution of nerolin 1 part, solution rhodinol I. 1 part, Cologne spirit 3 parts. Mix.

Lily of the Valley. (Muguet). Solution cinnamol 1 part, solution rhodinol I. 1 part, solution heliotropin 2 parts, solution ionone 1 part, solution vanillin 1 part, Cologne spirit 3 parts. Mix.

Linalool or Linaloe. Essence of linaloe 2 parts, essence of bergamot 1 part, solution rhodinol I. 2 parts, solution nerolin 1 part, solution coumarin 1 part, Cologne spirit 3 parts. Mix.

May Blossoms. (Aubépine). **White Hawthorn.** Solution heliotropin 2 parts, solution nerolin 1 part, solution amygdalol 1 part, solution coumarin 1 part, solution vanillin 1 part, solution rhodinol I. 1 part, Cologne spirit 3 parts. Mix.

Meadow Bouquet. (Bouquet des Champs). Essence of lemon grass 1 part, solution rhodinol I. 1 part, solution heliotropin 1 part, solution hyacinthol 1 part, solution vanillin 1 part, essence of bergamot 1 part, solution of ionone 1 part, Cologne spirit 3 parts. Mix.

Moss Rose. Solution rhodinol II. 5 parts, solution nerolin 1 part, solution vanillin 1 part, solution artificial musk $\frac{1}{4}$ part, Cologne spirit 3 parts. Mix.

Myrtle. (Amaryline). Solution hyacinthol 1 part, solution nerolin 1 part, solution coumarin 1 part, solution amygdalol 1 part, solution cinnamol 1 part, essence lavender 1 part, extract of orris 1 part, Cologne spirit 3 parts. Mix.

New Mown Hay. (Foin Coupé). Solution coumarin 4 parts, solution rhodinol I. 1 part, solution nerolin 1 part, solution heliotropin 1 part, Cologne spirit 3 parts. Mix.

Newport Fancy. Solution rhodinol I. 2 parts, solution ionone 2 parts, solution heliotropin 1 part, solution nerolin 1 part, solution vanillin 1 part, Cologne spirit 3 parts. Mix.

Orange Blossom. Solution nerolin 4 parts, solution heliotropin 1

part, solution coumarin 1 part, solution hyacinthol 1 part, Cologne spirit 3 parts. Mix.

Orchida. Solution amygdalol 1 part, solution nerolin 1 part, solution rhodinol I. 1 part, essence ylang-ylang 1 part, solution heliotropin 1 part, extract orris 1 part, solution coumarin 1 part, Cologne spirit 3 parts. Mix.

Rose Perfumes. A variety of rose perfumes may be prepared with rhodinol II. as a basis. A solution should be prepared as directed for solution rhodinol, using rhodinol II. 1 part, with Cologne spirit 19 parts. This is to be used in the rose perfume formulas.

Spring Flowers. Solution rhodinol I. 1 part, solution coumarin 2 parts, essence bergamot 2 parts, solution cinnamol 1 part, solution hyacinthol 1 part, Cologne spirit 3 parts. Mix.

Sweet Pea. Solution heliotropin 2 parts, solution coumarin 2 parts, solution vanillin 1 part, solution rhodinol I. 1 part, solution nerolin 1 part, Cologne spirit 3 parts. Mix.

Syringia. Solution hyacinthol 3 parts, solution rhodinol I. 1 part, solution nerolin 1 part, solution coumarin 1 part, solution vanillin 1 part, Cologne spirit 3 parts. Mix.

Tea Rose. Solution rhodinol II. 5 parts, solution nerolin 1 part, essence santal 1 part, solution ionone 1 part, Cologne spirit 3 parts. Mix.

Tuberose. Solution rhodinol I. 1 part, solution heliotropin 2 parts, solution vanillin 1 part, Cologne spirit 3 parts. Mix.

White Lilac. Solution hyacinthol 3 parts, solution heliotropin 2 parts, solution nerolin 1 part, solution vanillin 1 part, solution rhodinol I. $\frac{1}{2}$ part, Cologne spirit 3 parts. Mix.

White Rose. Solution rhodinol II. 4 parts, solution ionone 2 parts, solution heliotropin 1 part, essence patchouli $\frac{1}{2}$ part, Cologne spirit 3 parts. Mix.

Wild Violets. Solution ionone 5 parts, solution rhodinol I. 1 part, solution nerolin 1 part, Cologne spirit 3 parts. Mix.

Wood Violets. Solution ionone 1 part, solution rhodinol I. 1 part, solution nerolin 1 part, extract tonqua 3 parts, solution coumarin 1 part, Cologne spirit 3 parts. Mix.

Yara Yara. Solution heliotropin 2 parts, solution nerolin 2 parts, solution vanillin 1 part, solution rhodinol I. 1 part, essence ylang-ylang 1 part, Cologne spirit 3 parts. Mix.

Fixers and Coloring for Perfumes.

"Fixers" for Synthetic Perfumes. It will be observed that in the foregoing formulas "fixing" ingredients are but little used as they are in perfumes made from flower pomades and essential oils. They are hardly necessary in the synthetic perfumes for the reason that the solutions used have considerable permanence of odor, and for

another reason that the public taste does not now so much demand permanence of odors as it does sweetness and richness of scent. Fixing essences and extracts may be added in small quantities to any of the formulas desired. Musk, ambergris, santal wood, benzoin, wild ginger etc., are the ingredients used if any.

Colors for Perfumes. A variety of colors are furnished by manufacturers, designed to make their appearance more attractive. While the variety in a show case or on shelves may be desirable, in our opinion the colors "cheapen" the perfumes. Green, red, lilac, violet, in different shades, may be had. Chlorophyll soluble in alcohol is generally used for the green, and some aniline compounds for the other colors. Diluted solutions should be made with alcohol and used to color as desired.

COLOGNES AND TOILET WATERS.

Colognes are fragrant compounds of much less strength and permanence of odor than the foregoing extracts.

In addition to their legitimate use as toilet waters, they now take the place, to a large extent, of the cheaper grades of perfumes that were formerly sold.

As with the handkerchief extracts the combinations that may be made are almost infinite, though but few have ever met with great public favor.

The formulæ which follow represent those most widely known and esteemed as Colognes; but as any of the handkerchief extracts may be made into Colognes, by following the "General Cologne Formula," the druggist may choose such as suits his fancy, and have as large a variety as he pleases.

Colognes prepared from handkerchief extracts may also be put up as cheap perfumes; the grade that the druggist wishes to prepare may be regulated by the amount of Cologne spirit added.

For Second Grade Perfumes taking handkerchief extract 1 part, Cologne spirit 1 part.

For Third Grade Perfumes taking handkerchief extract 1 part, Cologne spirit 2 parts, and for Colognes, the following **General Cologne Formula**: Handkerchief extract 1 part, Cologne spirit 3 parts, water (distilled) q. s. If rose water or orange flower water is added instead of distilled water the product will be improved. Rose water may be used with all extracts, but orange flower water is preferred in those compounds which contain triple extract orange flowers or essence of neroli.

Mix the extract with $2\frac{1}{2}$ parts of the Cologne spirit, and add water gradually until, when shaken up, it remains after standing a short time, just a trifle cloudy or milky, then add the balance of the Cologne spirit, and set away for a month or more before using.

These colognes may be named from the extracts of which they are made, as White Rose Cologne, Marie Stewart Cologne etc., and the druggist may have no lack of the cheaper grades of perfumes and colognes by following these directions.

Standard Colognes.

Farina Cologne. Essence bergamot 10 parts, essence lavender 2 parts, essence lemon 2 parts, essence orange 2 parts, essence cloves 1 part, essence cassia 1 part, essence rose 2 parts, essence geranium 1 part, triple extract jasmine 6 parts, extract angelica 1 part, extract orris 3 parts, extract musk seed 2 parts, essence nutmeg 1 part, essence spearmint 2 parts, essence thyme $\frac{1}{2}$ part, essence cajuput $\frac{1}{2}$ part, Cologne spirit 400 parts, distilled water 60 parts. Mix the essences etc. with the Cologne spirit and gradually add the water. If it should remain milky after the addition of the water add enough Cologne spirit to clear.

Floral Cologne. Essence bergamot 10 parts, essence cassia 4 parts, essence orange 6 parts, essence lavender 2 parts, essence lemon 6 parts, essence santal 2 parts, essence neroli 2 parts, essence rose geranium 4 parts, extract orris 4 parts, extract tonqua 2 parts, extract ambergris 2 parts, Cologne spirit 300 parts, rose water 50 parts. Mix the essences etc. with the Cologne spirit and gradually add the rose water. If milky after standing add enough Cologne spirit to clear.

Florida Water. Oil of lavender flowers, English, 6 fl.drachms, oil of bergamot 2 fl.drachms, oil of lemon $1\frac{1}{2}$ fl.drachms, oil of cloves 20 minims, oil of cassia 10 minims, oil of orange 30 minims, essence rose 60 minims, essence neroli 10 minims, Cologne spirit 15 fl.ounces. Mix.

German Cologne, A. 1. Essence rose geranium 8 parts, essence orange 10 parts, essence cassia 6 parts, essence bergamot 10 parts, essence cloves 1 part, essence neroli 2 parts, essence lavender 4 parts, essence rose 4 parts, essence verbenia 2 parts, essence santal 4 parts, extract ambergris 1 part, extract musk 1 part, tincture cardamom 1 part, Cologne spirit 300 parts, rose water 50 parts. Mix the essences etc. with the Cologne spirit, add the rose water gradually and, if milky, enough Cologne spirit to make clear.

German Cologne, 2nd. Essence bergamot 10 parts, essence lemon 6 parts, essence orange 6 parts, essence rosemary 6 parts, essence cassia 4 parts, extract orris 4 parts, extract tonqua 2 parts, extract musk seed 4 parts, tincture benzoin 1 part, Cologne spirit 400 parts, rose water 60 parts. Mix the essences etc. with the Cologne spirit, add the rose water gradually and, if milky, enough Cologne spirit to make clear.

Hoyt's German Cologne. The following formula has been published as similar to Hoyt's German Cologne: Oil of bergamot 1 ounce, oil lemon 1 ounce, oil neroli $\frac{1}{4}$ ounce, oil santal wood $\frac{1}{2}$ ounce, camphor 20 grains, Cologne spirit 7 pints, rose water 1 pint. Mix and let stand a month, then filter.

Lavender Cologne or Water. Essence lavender 3 parts, essence lemon 2 parts, essence cassia 1 part, essence cloves 1 part, essence santal 1 part, Cologne spirit 60 parts, water 10 parts. Mix the essences with the Cologne spirit, add the water gradually, then enough Cologne spirit to clear, if milky.

Musk Cologne. Essence bergamot 2 parts, essence lavender 2 parts, essence lemon 4 parts, essence neroli 1 part, extract musk 4 parts, Cologne spirit 60 parts, rose water 10 parts. Mix the essences etc. with the Cologne spirit, add the rose water gradually, and then enough Cologne spirit to clear, if milky.

White Rose Cologne. Oil neroli bigarade 1 drachm, oil neroli petit grain $\frac{1}{2}$ drachm, oil bergamot 2 drachms, oil patchouly 1 drachm, oil rose 3 drachms, extract musk 2 ounces, tincture tolu 2 ounces, Cologne spirit 7 pints, rose water 1 pint. Dissolve the oils in the spirit and add the rose water, let stand 30 days and filter.

Violet Water. This may be made by diluting extract of violet with 4 parts of Cologne spirit. Other toilet waters may be made in the same general manner.

Other Colognes and Toilet Waters may be made by the general formula. They may be made as the fancy of the maker may select, and may be made stronger or weaker as may be desired, to correspond with the trade for which they are intended.

SYNTHETIC COLOGNE.

The foregoing formulas for colognes represent most of those that have been favorites in the past, but now that the synthetic perfume bodies have come into use, good colognes may be quickly and readily made, and they will, no doubt, to a large extent, take the place of the time honored products of the preceding century. A few formulas are given, but a great variety may be made in the same manner as the synthetic perfumes, by using a greater proportion of Cologne spirit and from 10 to 25 percent. of water in the formulas.

Fragrant Flowers Cologne. Solution of rhodinol I. 1 part, solution of hyacinthol 2 parts, solution of heliotropin 2 parts, solution of nerolin 2 parts, solution of vanillin 1 part, Cologne spirit 70 parts, distilled water 22 parts. Mix the solutions with the Cologne spirit and gradually add the water.

Forest Flowers Cologne. Solution of amygdalol 1 part, solution of coumarin 1 part, solution of heliotropin 2 parts, solution of ionone 1 part, solution of hyacinthol 1 part, Cologne spirit 70 parts, distilled water 23 parts. Mix them.

Florida Flowers Cologne or Florida Water. Essence of lavender 10 parts, essence of bergamot 3 parts, essence of lemon 2 parts, solution of nerolin 1 part, Cologne spirit 65 parts, distilled water 17 parts. Mix, and after standing, filter.

SACHET POWDERS ETC.

A great variety of sachet powders may be made by adding to an aromatic base composed of ground roots, barks, woods, flowers, leaves etc., bulk perfumes or essential oils. A few formulas for the best selling powders are given here, and others may be made in the same general way.

General Base for Sachet Powders. Orris root, in coarse powder, 1 pound; santal wood, ground, 4 ounces, vanilla beans, ground or cut fine, 1 ounce; rose leaves (flowers), ground, 6 ounces; extract musk $\frac{1}{2}$ ounce, extract civet $\frac{1}{2}$ ounce. Mix them well together. To make any variety of sachet powder add to 8 ounces of this 1 ounce of the bulk perfume of the kind desired, and mix them thoroughly.

The following are formulas for those most popular:

Frangipanni Sachet. Powdered orris 3 pounds, ground vitivert $\frac{1}{4}$ pound, coarsely ground vanilla beans $\frac{1}{4}$ pound, ground tonquin beans 2 ounces, oil neroli 60 minims, oil santal 40 minims, oil bergamot 60 minims, oil French geranium 60 minims, otto rose 30 minims, extract musk 1 ounce, extract civet $\frac{1}{2}$ ounce. Mix well.

Heliotrope Sachet. Powdered orris $2\frac{1}{2}$ pounds, ground rose leaves 1 pound, ground vanilla beans 6 ounces, ground tonquin beans 4 ounces, extract musk $1\frac{1}{2}$ ounces; extract civet $\frac{1}{2}$ ounce, essential oil of almonds 7 minims. Mix.

Rose Sachet. Powdered orris $\frac{1}{2}$ pound, ground rose leaves $1\frac{1}{2}$ pounds, ground santal wood 4 ounces, ground patchouly 2 ounces, extract civet $\frac{1}{2}$ ounce, oil French geranium 30 minims, otto rose 20 minims. Mix.

Jockey Club Sachet. Powdered orris 3 pounds, ground santal wood $\frac{1}{2}$ pound, oil bergamot 1 ounce, otto rose 30 minims, extract musk 2 ounces, extract civet 1 ounce.

Essence Bouquet Sachet. Powdered orris 4 pounds, ground cassie leaves (flowers) 1 pound, ground rose leaves (flowers) 1 pound, ground vanilla beans 3 ounces, essence bergamot 1 ounce, essence lemon 1 ounce, oil French geranium 60 minims, extract musk 2 ounces, extract ambergris $\frac{1}{2}$ ounce. Mix.

Ylang-Ylang Sachet. Ground rose leaves 1 pound, ground cassie leaves 1 pound, ground pimento $\frac{1}{4}$ pound, ground tonquin beans 2 ounces, ground vanilla beans 2 ounces, powdered orris 3 pounds, oil pimento 60 minims, oil bergamot 120 minims, oil ylang-ylang 120 minims, otto rose 20 minims, extract musk 1 ounce, extract civet $\frac{1}{2}$ ounce, gum benzoin (ground) 1 ounce. Mix.

Violet Sachet. Powdered orris 3 pounds, essence bergamot 30 minims, essential oil of almonds 20 minims, otto rose 20 minims, extract musk 1 ounce. Mix.

Potpourri for Rose Jar. Mixtures of rose leaves etc. for filling rose jars are now considerably used. A favorite mixture for this purpose is

as follows: Rose leaves (flowers) whole, 1 pound; patchouly leaves 4 ounces, violet flowers 4 ounces, vanilla, cut fine, $\frac{1}{2}$ ounce, cinnamon, in coarse powder, $\frac{1}{2}$ ounce; orris root, in coarse powder, $\frac{1}{2}$ ounce; cloves, in coarse powder, $\frac{1}{4}$ ounce; oil bergamot $\frac{1}{2}$ ounce, musk extract 1 ounce. Mix the oil and musk thoroughly with the powdered drugs and then with the leaves etc. By grinding the leaves etc. to a coarse powder this may be used as a sachet powder; other combinations may be made in the same manner by using other flowers etc. in combination, as lavender, vitivert etc.

Synthetic Additions. Synthetic bodies, solutions or perfumes may be added to any of the foregoing powders or mixtures to give them a stronger or different scent. It is better to add the substances in solution because their odorous properties are then developed. Solution of coumarin, vanillin, heliotropin, nerolin, artificial musk, rhodinol, hyacinthol or other solutions or combinations of them suited to represent the odor intended to be prominent in the sachet may be added as desired, the result being very satisfactory and taking.

Almond Meal. A true almond meal may be made by first blanching almonds (by soaking them in warm water and removing their outer covering) then drying them and reducing them to a fine powder, which may be flavored with a little essence of bitter almond. The true almond meal is seldom put up for sale, but a composition is sold bearing that label. Peach or plum kernels prepared as above directed is quite commonly sold as almond meal and for cheap grades, fine canelle, obtained at flouring mills is flavored with essence of almond or amygdalol solution. A portion of neutral powdered soap is sometimes added to the canelle to give it the slippery feeling.

SMELLING SALTS OR PUNGENTS.

The sale of smelling salts or pungents, which for a time was quite limited, has revived somewhat. The following formulas make satisfactory preparations. Synthetic bodies or odors may be added to these salts as may be desired to give them a pronounced odor.

Pungent Smelling Salts. If something fine is desired without regard to cost, this is recommended: Ammonium carbonate, crushed to a coarse powder, 6 ounces; sal ammoniac, granulated, 1 ounce; pure potash (caustic potash), crushed fine, 2 ounces; orris root, in coarse powder, 4 ounces; lemon peel, in coarse powder, rosemary leaves, in coarse powder, lavender leaves, in coarse powder, each, 1 ounce; cloves, cinnamon, calamus, each in powder, $\frac{1}{2}$ ounce; oil of bergamot $\frac{1}{2}$ ounce, oil of lemon 2 drachms, extract of musk or civet $\frac{1}{2}$ ounce, stronger ammonia water $\frac{1}{2}$ ounce. Mix them well together.

Smelling Salts. A more common article may be made as follows: ammonium carbonate, crushed to a coarse powder, 12 ounces; powdered orris 4 ounces, powdered cloves, powdered cassie, powdered

calamus, each, 1 ounce; stronger ammonia water 1 ounce, oil of bergamot $\frac{1}{2}$ ounce, oil of lavender $\frac{1}{4}$ ounce. Mix them.

Preston's Salts. Ammonium carbonate, crushed, 4 ounces; stronger ammonia water $\frac{1}{4}$ ounce, oil of cloves, oil of lavender, oil of bergamot, each, 10 drops. Mix them well together.

Sal Prunelle Pungents. Sal prunelle, which is prepared by fusing potassium nitrate with $\frac{1}{128}$ part of its weight of sulphur in a crucible, and casting in molds into small balls, is put in a wide-mouth pungent bottle, enough of the balls to nearly fill the bottle and perfumed, strong ammonia water added. The ammonia water may be perfumed with most any of the synthetic perfumes.

Vinaigrettes. These are employed like smelling bottles and for similar purposes. Any inert aromatic substance, as orris or a mixture of aromatic powdered drugs may be saturated with glacial acetic acid with which one-fourth the quantity of bulk perfume is mixed. The toilet vinegars mentioned further on may also be employed for the same purpose.

Vinaigrettes may also be prepared with the sal prunelle balls in the same manner, only using glacial acetic acid instead of ammonia water as the liquid.

TOILET SOAPS.

Toilet soaps are seldom made except by experienced soap makers. The bases of toilet soaps are the common hard soaps referred to under a preceding article on soaps. For making the finer grades of toilet soaps these are shaved, milled or ground, and mixed as may be best suited for the required product, and the perfuming oils and ingredients worked into them. The mass is then slightly moistened, if necessary, and made up into the required quantity for cakes, and pressed in a mould into the shape desired.

The cheaper toilet soaps are made in the same manner as is directed for making hard soap in the article referred to, but are more or less perfumed with essential oils or odorous substances.

An infinite variety of toilet soaps are supplied by the soap makers, and druggists may themselves make them by securing the proper appliances. The perfumes for the soaps depend upon the price for which they are to be sold, and may be selected from the formulas already given for bouquets of different kinds, and from the essential oils suitable for the purpose. Glycerin in small quantities is frequently added to toilet soaps, and they are variously colored with harmless ingredients to suit the taste or the caprice of the manufacturer. The synthetic perfumes are much used for perfuming fine toilet soaps.

As so great a variety of toilet soaps is required, and so few make them, it would be inexpedient to give formulas for them here.

Liquid Soaps.

There have recently come into use soaps in liquid form, to be used with some tipping device for discharging a small quantity at a time upon the hands at the wash sink. These are considerably used at hotels and in toilet rooms. The following formulas may be employed for making preparations for this purpose.

Peerless Liquid Soap. White Castile soap, in shavings, 4 ounces; alcohol 4 ounces, essence bitter almond 1 fl.drachm, essence sassafras 2 fl.drachms, water sufficient to make 16 ounces. Dissolve the Castile soap shavings in the alcohol and water and add the essences. After standing for some time, filter clear. Other curd soaps may be used for making liquid soap in the same manner. This is simply a solution of Castile soap, but is the best of the liquid soaps and, when prepared in this manner, is the most efficient of any of the liquid soap compounds.

Acme Liquid Soap. Transparent glycerin soap 4 ounces, water 12 fl.ounces, alcohol 2 ounces. Dissolve the soap in the water heated to about 160°F., and add the alcohol. When cold, filter and add through the filter enough water to make 16 fl.ounces. This may be made with the ordinary transparent glycerin soap of commerce, but there is considerable difference in the specific gravity and alkaline constituents of this soap as found in the market. The soap selected for this purpose should be the medium quality of transparent glycerin soap.

TOILET VINEGARS.

A class of preparations for the toilet called Aromatic Vinegars have a limited sale. They are chiefly used after bathing and washing the hands and face to impart a freshness to the skin and for their agreeable odor. The following formulæ will suffice:

Aromatic Vinegar. Glacial acetic acid 8 ounces, Cologne spirit 4 ounces, camphor, in small pieces, 1 ounce; oil of cloves 45 minims, oil of rosemary 30 minims, oil of bergamot, oil of cinnamon, oil of lavender, oil of pimento, oil of neroli, each, 15 minims. Mix, let stand until the ingredients are dissolved and filter.

Aromatic Vinegar. This may also be made by mixing any kind of bulk perfume with the other ingredients instead of the essential oils, as glacial acetic acid 8 ounces, Cologne spirit 2 ounces, camphor 1 ounce, bulk perfume or Cologne (as desired) 2 ounces. Mix, dissolve and filter.

To use these vinegars a small quantity is added to a bowl of water and usually applied with a soft sponge.

TOILET WATERS.

Toilet waters, as they are known in the market, are not as their name would indicate, waters, but solutions of essential oils or odorous

principles in alcohol or a partly alcoholic liquid, prepared either by solution or distillation. These are known as Eau de Cologne, Eau de Lavande, Eau de Voilette etc., and have been noticed under Perfumes and other headings. The name is also applied in a general way to perfumed waters and spirits made by distilling herbs and odorous substances with water or a diluted alcoholic liquid; but as these have already been noticed under other headings, as Aquæ, Spiritus etc., further formulæ will be unnecessary.

Antiseptic Camphor Cream.

Best flake tragacanth 1 ounce, boric acid $\frac{1}{4}$ ounce, glycerin 8 fl. ounces, spirit of camphor 4 fl. ounces, water 4 pints, bulk perfumes 1 ounce. Dissolve the boric acid in 2 pints of the water and glycerin; soak the tragacanth in the solution, stirring frequently, during 7 days, then strain through a cheese-cloth strainer with pressure. To the residue in the strainer add 2 pints more of water and allow to stand 2 days, then strain, with pressure, and add to the previously strained paste, stirring them well together; to this add the spirit of camphor and bulk perfume, mixing them intimately. This is an antiseptic cream, excellent for application to the skin for sunburn and irritation, and for use after shaving. It is a refreshing antiseptic application much liked by all who use it.

The foregoing formulas comprise most of the toilet preparations and perfumes that are popular on the market, and all that it is expedient or desirable for druggists to prepare. If it is intended to engage extensively in the manufacture of perfumes and like articles, many other formulas would be required, for which the reader is referred to comprehensive works on perfumery, soap making etc.

PART V.

FLAVORING EXTRACTS, SODA WATER REQUISITES, CONFECTIONERY, ETC.

FLAVORING ESSENCES AND EXTRACTS.

Under this heading it is intended to include in this work only such extracts and essences as are used, in some manner, for flavoring the various soft drinks, confections, pastry etc., with which the public are familiar. Some of the essences mentioned here, being solutions of essential oils official in the pharmacopœias, are also included under the heading Spirits, in Part II. of this work; others mentioned in this section as extracts are also official and are noted under various headings in Part II.

Solutions of Essential Oils.

The solutions of essential oils in spirits have been familiarly known from time immemorial as "essences," and the characteristic "Yankee Essence Pedler" is not even now entirely extinct in the rural districts.

No uniform standard of strength has ever been adopted for essences, but the general practice of pharmacists in this country is to use 1 ounce of the oil in a pint of alcohol for all the more common ones, but peddler's essence is made much weaker as a rule.

It is needless to remark that only the best quality of oils and good cologne spirit or alcohol should be used in making all these preparations. Many of them are used for flavoring soda water syrups, and are known as "Concentrated Extracts." Others are extensively used for flavoring confectionery, ice cream and for culinary use, and some are well known domestic remedies.

Anise Essence. Oil of anise 1 fl.ounce, cologne spirit 15 fl.ounces. Mix them. This is the essence intended to be used for flavoring. The essence of anise of the Br. P. contains 20 percent. of the oil, which is double the strength of the U. S. spirit of anise; both are stronger than is generally sold as essence of anise. The U. S. official spirit of anise is: Oil of anise 100 Cc., deodorized alcohol 900 Cc.

Bay Essence. Oil of bay leaves 4 fl.drachms, cologne spirit 1 pint. Mix them. This is used for flavoring soups etc., in the place of the leaves. A soluble essence of Bay for making Bay Rum may be made by dissolving 4 fl.drachms of oil of bay in 6 ounces cologne spirit, rubbing 6 drachms of magnesium carbonate with 8 ounces of water, adding the mixture to the solution and filtering.

Bitter Almond Essence. Oil of bitter almond 4 fl.drachms, cologne spirit 1 pint. Mix them. This is sold as the concentrated essence or extract of bitter almond, and is the essence intended to be used for flavoring. A good ordinary essence may be made by dissolving 1½ fl.drachms of oil bitter almond in 8 fl.ounces of alcohol and adding 8 fl.ounces of water. The U. S. official spirit of bitter almond is: Oil of bitter almond 10 Cc., deodorized alcohol 800 Cc., water sufficient to make 1000 Cc.

Calamus or Sweet Flag Essence. Oil of calamus 1 fl.ounce, cologne spirit 15 fl.ounces. Mix them. Used for flavoring confectionery etc., and in making bitters. An extract also may be made by macerating 4 ounces av. of powdered calamus in a pint of alcohol.

Caraway Essence. Oil of caraway seed 1 fl.ounce, cologne spirit 15 fl.ounces. Mix them. Used for flavoring confectionery, pastry etc.

Cardamom Essence. Oil of cardamom seed 4 fl.drachms, cologne spirit 15 fl.ounces. Mix them. Used for flavoring etc. The oil of cardamom is quite expensive but of fine flavor. An extract may also be made by macerating 4 ounces of powdered cardamom seed in a pint of alcohol.

Cassia or Cinnamon Essence. Oil of cassia 1 fl.ounce, cologne spirit 15 fl.ounces. Mix them. This is the essence intended to be used for flavoring. The U. S. spirit of cinnamon contains 10 percent. of the oil; the Br. contains but 5 percent.

Celery Essence. Oil of celery 4 fl.drachms, cologne spirit 1 pint. Mix them. Used for flavoring. An extract is also made from celery seed by percolating celery seed, in powder, with alcohol until a pint is obtained.

Cherry Essence. Cherry laurel oil 4 fl.drachms, cologne spirit 1 pint. Mix them. Used for flavoring.

Clove Essence. Oil of cloves 1 fl.ounce, cologne spirit 1 pint. Mix them. Used for flavoring etc.

Cognac Essence. Oil of cognac 2 fl.drachms, cologne spirit 1 pint. Mix them. This is used chiefly for making artificial brandy. Good oil

of cognac is very expensive. This essence may be diluted if desired.

Coriander Essence. Oil of coriander 4 fl.drachms, cologne spirit 1 pint. Mix them. Used for flavoring.

Curaçoa Essence. Oil of curaçoa 1 fl.ounce, cologne spirit 15 fl.ounces. Mix them. Used for flavoring, like orange.

Dill Essence. Oil of dill 1 fl.ounce, cologne spirit 15 fl.ounces. Mix them. Used for flavoring pickles etc.

Fennel Essence. Oil of fennel seed 1 fl.ounce, cologne spirit 15 fl.ounces. Mix them.

Hemlock Essence. Oil of hemlock 1 fl.ounce, cologne spirit 15 fl.ounces. Mix them.

Lemon Essence. Oil of lemon, fresh, 1 fl.ounce; fresh lemon peel, chopped fine or grated, 1 ounce av.; cologne spirit 15 fl.ounces. Mix them and macerate for 7 days, then filter. The outer, yellow portion of the peel should only be used. If the fresh lemon peel cannot readily be obtained, color with a few chips of fustic. This essence is the well-known extract of lemon, so much sold as a flavoring extract. It may be made stronger or weaker, if desired, by using more or less lemon oil, but this formula makes an extract fully up to the standard and is the essence of lemon intended to be used for flavoring. The U. S. P. directs oil of lemon 50 Cc., lemon peel, grated, 50 Gm., with deodorized alcohol sufficient to make 1000 Cc.

Lime Essence. Oil of limes 1 fl.ounce, cologne spirit 15 fl.ounces. Mix them. Used as a flavoring, like lemon.

Mace Essence. Oil of mace, etherial, 1 fl.ounce; cologne spirit 15 fl.ounces. Mix them. Used as a flavoring, like nutmeg.

Mustard Essence. Oil of mustard, essential, 4 fl.drachms; cologne spirit 1 pint. Mix them. Oil of mustard must be carefully handled.

Nutmeg Essence. Oil of nutmeg 1 fl.ounce, cologne spirit 15 fl.ounces. Mix them. Used for flavoring. The U. S. and Br. direct 5 percent. of the oil for making spirit of nutmeg.

Orange Essence. Oil of sweet orange, fresh, 1 fl.ounce; fresh orange peel, outside, grated, 1 ounce av.; cologne spirit 15 fl.ounces. Mix them and macerate for 7 days, then filter. See remarks after lemon essence. This is the essence intended to be used for flavoring. The U. S. official formula is: Oil of orange 50 Cc., orange peel, grated, 50 Gm., with deodorized alcohol enough to make 1000 Cc.

Parsley Essence. Oil of parsley 4 fl.drachms, cologne spirit 15 ounces. Mix them and filter.

Pennyroyal Essence. Oil of pennyroyal 1 fl.ounce, cologne spirit 15 fl.ounces. Mix them and filter.

Peppermint Essence. Oil of peppermint 1 fl.ounce, cologne spirit 15 fl.ounces. Mix them and filter. This is the essence intended to be used for flavoring. It is customary with some druggists to color essence of peppermint green, which may be done by adding a little pep-

permint herb to the essence or a little grass-green coloring. The U. S. P. spirit of peppermint contains 10 percent. of the oil.

Pimento or Allspice Essence. Oil of pimento 1 fl.ounce, cologne spirit 15 fl.ounces. Mix them. Used for flavoring.

Rose Essence. Oil of rose 1 fl.drachm, cologne spirit 1 pint. Mix them. This may be reduced if a cheaper essence is desired.

Rosemary Essence. Oil of rosemary 1 fl.ounce, cologne spirit 15 fl.ounces. Mix them.

Sage Essence. Oil of sage 1 fl.ounce, cologne spirit 15 fl.ounces. Mix them.

Sarsaparilla Essence. Oil of sassafras 3 fl.drachms, oil of wintergreen 4 fl.drachms, oil of anise 30 minims, cologne spirit 12 fl.ounces, water 3 fl.ounces. Mix them. This is the popular "Sarsaparilla flavoring" so much used for flavoring soda water, syrup sarsaparilla etc. A stronger flavor can be made by using a larger quantity of the oils and no water.

Sassafras Essence. Oil of sassafras 1 fl.ounce, cologne spirit 15 fl.ounces. Mix them.

Spearmint Essence. Oil of spearmint 1 fl.ounce, cologne spirit 15 fl.ounces. Mix them. This may be colored with spearmint herb or grass-green coloring, if desired. See remarks under essence peppermint. The U. S. P. spirit of spearmint contains 10 percent. of the oil.

Wintergreen Essence. Oil of wintergreen 1 fl.ounce, cologne spirit 15 fl.ounces. Mix them. This is the essence intended to be used for flavoring. Th U. S. P. directs spirit of gaultheria to be made with 5 parts oil of wintergreen and 95 parts of alcohol.

Wormwood Essence. Oil of wormwood 1 fl.ounce, cologne spirit 15 fl.ounces. Mix them.

Other Essences.

Essences of other oils may be made in the same manner as the preceding, the judgment of the druggist directing how much of the essential oil should be used with a pint of alcohol.

CONCENTRATED EXTRACTS.

In this department are included the liquid extracts of substances not esential oils, that are used as flavoring extracts, or for flavoring beverages, pastry etc. Some of them are properly fluidextracts, others are tinctures, and others are mixtures of both extracts and essences.

Angelica Extract or Essence. Angelica root, in coarse powder, 4 ounces av.; alcohol 12 fl.ounces, water sufficient to make 1 pint. Mix 4 ounces of water with the alcohol and macerate the drug in the mixture for 7 days, then pour off the liquid, transfer the drug to a percolator and percolate first with the poured off liquid, then with water, until a pint is obtained.

This may also be made by mixing $\frac{1}{2}$ fl.ounce oil of angelica with a pint of cologne spirit.

Beef or Meat Extract, Essence or Juice.

A variety of preparations are sold under this name. The extracts of meat or beef are usually of the consistence of a soft solid extract, while some are gelatinous. The essences of beef found in the market are liquid. Of the beef or meat extracts, Liebig's is the most popular. It is made on a large scale in South America by evaporating meat juices in vacuo in large iron cylinders—the finished extract representing 32 times its weight of fresh meat. It is much used in making wine of beef and iron and other similar nutritive preparations, and for making soups and other articles of diet.

Essence of Beef or Meat Juice is prepared from the expressed juice of fresh meat, condensed and preserved with glycerin. One of the most popular meat juices in this country is Valentine's. It is said to contain the nutritive value of 2 pounds of beef in a fluidounce.

In a small way meat juice may be made by chopping fresh beef-steak fine, enclosing it in a linen cloth, and pressing it in a lemon squeezer or a small press. It is much better and more nutritious than beef tea.

Coffee Extract or Essence. Fluidextract of Coffee. Java coffee, browned or roasted, 8 ounces av.; Mocha coffee, browned or roasted, 8 ounces av.; alcohol 8 fl.ounces, water sufficient to make 1 pint. Grind the coffee to a moderately fine powder, mix the alcohol with 8 ounces of water and moisten the powder with 8 ounces of the mixture, pack firmly in the water-bath percolator, pour the remainder of the mixture upon it and set in a warm place for 1 day; then heat moderately and, after 1 hour, begin to percolate, adding water through the percolator and continuing the percolation until 14 fl.ounces are obtained, which reserve; continue the percolation with water until the drug is exhausted, then evaporate to 2 fl.ounces and add the reserved liquid to make a pint. This is a fluidextract of coffee. It may be used for flavoring soda water syrup etc., or medicinally. It requires about 4 ounces to flavor a gallon of coffee syrup for soda water.

Jamaica Ginger Extract or Essence. Fluidextract of Jamaica Ginger. Extracts or essences of Jamaica ginger are well known as proprietary remedies, and are considerably used as flavors for pastry and other articles of diet. The following formula is for a fluidextract of Jamaica ginger, which is used chiefly for flavoring, or may be diluted for the proprietary essence of Jamaica ginger: Jamaica ginger, in moderately fine powder, 16 ounces av., alcohol a sufficient quantity. Moisten the powder with alcohol, pack firmly in a water-bath percolator, pour upon it sufficient alcohol to cover it and set in a warm place for 2 days; then heat moderately for 1 hour and begin to perco-

late, adding alcohol to the drug and continuing the percolation until 14 fl.ounces are obtained, which reserve. Continue the percolation with alcohol until the drug is exhausted, then concentrate the latter percolate by distillation to 2 ounces and add to the reserved portion to make a pint of fluidextract of Jamaica ginger.

This is used as a flavoring for soda water syrup and other beverages. To make the proprietary essence of Jamaica ginger, mix 3 parts of this extract with 5 parts of cologne spirit.

Fluidextract of ginger is official in the U. S. P.

Orris Extract or Essence. Orris root, in moderately fine powder, 4 ounces av., cologne spirit sufficient to make 1 pint. Moisten the powder with cologne spirit, pack firmly in the water-bath percolator, cover with cologne spirit, let stand 2 days, then heat moderately 1 hour and percolate with cologne spirit until a pint has passed. Used for flavoring and in compound perfumes, and sometimes in making violet soda water syrup. It has the odor of violets.

Violet Extract. The preceding is also known as Violet Extract or Essence, and may be used for flavoring where violet is directed.

Sherbet Extract or Essence. Vanilla extract (from vanilla beans), 6 fl.ounces; oil of orange, fresh, 3 fl.drachms; oil of rose 3 minims, amyl acetate 1 fl.drachm, cologne spirit 8 fl.ounces. Mix them, filter.

Tonka Extract or Essence. Tonka beans, in fine powder, 4 ounces av.; cologne spirit 1 pint. Moisten the powder with the cologne spirit, pack firmly in the water-bath percolator, cover with cologne spirit and let stand for 2 days; then heat moderately and percolate with cologne spirit until a pint has passed.

This was formerly much used to combine with vanilla for making a cheap vanilla extract, but is now rapidly going out of use. It is considerably employed in perfumery, but solution of coumarin is used instead in most formulas.

Vanilla Extract or Essence. A great variety of extracts of vanilla are found on the market, and as it is one of the most important extracts, the selection of the beans for preparing it and the manner of making should be well understood.

The Mexican vanilla beans have the finest flavor, and the longer the bean, as a rule, the better the extract; but, owing to the increased value of the longer beans they are seldom used by large manufacturers.

The Bourbon beans are considerably used, but they have a ranker flavor, more like tonka, and a first-class extract cannot be made from them alone. They are, however, used to mix with the Mexican beans, and give a strength to the flavor which is considered desirable by some manufacturers, but is not liked by the best judges of good vanilla extract.

Owing to the high price of vanilla beans, they are liable to manipulation in the hands of unscrupulous dealers, and an extract is frequently made by soaking the whole bean in spirits, then drying and selling them. They are then brittle and lighter colored, and are practically worthless. It is best to buy them of a reliable house.

Several strengths of vanilla extract are made. One containing 4 ounces to a pint being usually called fluidextract of vanilla; one containing 2 ounces to the pint being called concentrated extract of vanilla, chiefly used in confectionery and for flavoring soda water etc.; and one for the popular trade, usually made 1 ounce to the pint, and called by any name the manufacturers choose to give it. Besides these, which rank as first-class, and vary only in strength, are the extracts made of vanilla and tonka, or of poorer quality of beans, which are much sold by grocers and also by druggists. The following are the formulas:

Fluidextract of Vanilla. Vanilla beans, cut fine, 4 ounces av.; cologne spirit 12 fl.ounces, water sufficient to make 1 pint. The beans are best cut fine with an Excelsior meat cutter, or by chopping in a chopping bowl; they should then be pounded in an iron mortar until they are thoroughly crushed or disintegrated; then pack them firmly in the water-bath percolator and pour upon them 8 ounces of cologne spirit, mixed with 4 ounces of water, and set in a warm place for 2 days; then heat moderately for 2 hours and begin to percolate. When the liquid has ceased to drop add the remaining 4 ounces of cologne spirit, mixed with 4 ounces of water, and continue the percolation, adding water, if necessary, through the percolator until a pint of the extract is obtained, then filter.

This extract is not sold except as a fluidextract or for special use to those who know its strength. It may be diluted 1:2 or 1:4 with diluted alcohol for making the two following extracts of vanilla.

Concentrated Extract of Vanilla. Vanilla beans, cut fine, 2 ounces av.; cologne spirit 12 fl.ounces, water sufficient to make. Make in the same manner as the preceding.

Extract of Vanilla. This is the flavoring extract of vanilla that is mostly made and sold by druggists and manufacturers when pure extract of vanilla is wanted. Vanilla beans, cut fine, 1 ounce av.; cologne spirit 10 fl.ounces, water sufficient to make 1 pint. Reduce the cut beans to a coarse powder by grinding in a meat grinder or by beating in an iron mortar, and put them in a pint wide-mouth bottle. Mix the cologne spirit with 6 ounces of water, pour one-third of the mixture upon the vanilla, and stop with a perforated cork; heat for 1 hour in a water-bath to about 160°F., pour off the liquid and reserve; pour on the drugs one-third more of the menstruum and heat as before, adding the liquid to the portion previously reserved. Pour on the remainder of the liquid, heat as before, and add the product to

the reserved extract, then add sufficient water to the vanilla in the bottle, heat again and pour off, adding the liquid to the reserved extract to make a pint of the extract of vanilla.

In making larger quantities of this extract it is best made by water-bath percolation, the same as the preceding.

Vanilla extract is much better to stand for several months before offering for sale as the flavor is improved by age. It may be made to advantage in larger quantities by macerating, stirring occasionally and leaving the vanilla in the bottom, pouring off from the top of the vessel in which it is made, when wanted, and finally filtering the last portion to free it from sediment. The addition of 1 ounce of sugar to each pint of vanilla extract improves it for most purposes.

A liberal portion of alcohol should be used in making extract of vanilla, because if the menstruum is too weak in spirit, the vanilla is softened to a mucilaginous mass and the extract will not filter clear, but is murky or fluorescent in appearance.

Vanilla-Tonka Extract. Many druggists mix a portion of tonka with vanilla to make an extract of vanilla. Although it gives a stronger flavor it is not the same as vanilla.

This is called by some manufacturers "Fortified Extract of Vanilla" but those who are accustomed to the true vanilla flavor think but little of it. It may be made by using: Vanilla beans $\frac{3}{4}$ ounce, tonka beans $\frac{1}{4}$ ounce, sugar 1 ounce, alcohol 10 fl.ounces, water sufficient to make 1 pint. Make in the same manner as extract of vanilla. Some manufacturers use a still larger proportion of tonka.

Extract Vanilla with Coumarin. A variety of tastes prevail regarding extract of vanilla. While some have been educated to the flavor of pure vanilla and are not satisfied with a mixed extract, the majority have been accustomed to a mixed extract and think it stronger than the pure vanilla. The following formula makes a good extract for general sale: Vanilla beans, cut fine and bruised, 6 ounces av.; coumarin 60 grains, sugar 8 ounces, cologne spirit 5 pints, water sufficient to make 1 gallon. Macerate the vanilla and coumarin in the spirit and water, with occasional agitation, or make the extract of vanilla as above directed by percolation or water-bath percolation, to measure 1 gallon, and dissolve the coumarin in the extract. A little burnt sugar coloring can be added to give it a stronger color.

Extract Vanillin. An artificial extract of vanilla is very conveniently made, at a much less expense than the regular extract, from vanillin. Although it is not an exact representative of vanilla flavor, it answers very well, and when combined with coumarin makes an excellent substitute for a cheap vanilla extract. The true vanillin extract may be made as follows: Vanillin 1 ounce, cologne spirit 1 gallon, syrup $\frac{1}{4}$ gallon, water $1\frac{1}{2}$ gallons. Dissolve the vanillin in the cologne spirit and add the water and syrup.

This may be made "double strength" by using the same quantity of vanillin, and only half the quantity of cologne spirit, syrup and water.

This makes a white vanilla extract which is much used by bakers and confectioners. It may be colored with caramel for putting up.

Extract Vanillin and Coumarin. Many prefer vanilla with the addition of tonka, as it gives a stronger flavor. The artificial extract may be prepared as follows: Vanillin 1 ounce, coumarin $\frac{1}{8}$ to $\frac{1}{4}$ ounce, cologne spirit 1 gallon, syrup $\frac{1}{4}$ gallon, water $1\frac{1}{2}$ gallons, caramel coloring, sufficient. Dissolve the crystals in the cologne spirit and add the syrup, water and coloring. Some prefer the greater quantity of coumarin, others do not. This may be made "double strength" by using the same quantities of vanillin and coumarin and only half the quantity of cologne spirit and water.

Cheap Extracts. For the grocery and peddler's trade cheap extracts, especially of lemon and vanilla, are made with a much lower percentage of the flavoring ingredients and spirit. It is necessary, however, to maintain the color, which may be done by using the same coloring materials as are directed, in sufficient quantities.

SOLUBLE FLAVORING EXTRACTS.

Most of the essences and extracts made from essential oils and substances containing oleo-resins, are insoluble in aqueous solutions, making cloudy or milky mixtures. It is desirable for many purposes that some of them should make clear solutions when mixed with water or syrup. A general formula is therefore given by which any of the essences made from oils may be made soluble, and a few special formulæ for others are given.

Some manufacturers also furnish so-called "soluble oils" from which soluble extracts may be made with 50% or less of alcohol. These oils are generally very expensive and not entirely satisfactory.

These soluble extracts are mainly used for soda water syrups and for making bottled beverages.

General Formula for Soluble Extracts.

The Essential Oil or Oils,	$\frac{1}{2}$ to 1	fl.ounce
Cologne Spirit,	9	fl.ounces
Magnesium Oxide, (Magnesia),	$\frac{1}{4}$ to $\frac{1}{2}$	ounce av.
Calcium Hydroxide, (Slaked Lime),	30	grains
Boiling Water, sufficient to make	1	pint

Mix the required oil or oils with the cologne spirit, rub $\frac{1}{4}$ to $\frac{1}{2}$ ounce of magnesium oxide and the calcium hydroxide with 8 ounces of boiling water, add the mixture to the solution, shaking occasionally, then filter, adding enough water through the filter to make a pint. As some oils are much less soluble than others in aqueous solutions, the filtered product may or may not make a clear solution with water.

This may be ascertained by dropping a few drops into a few ounces of water. If the solution is cloudy it will be necessary to rub the filtrate with more magnesium oxide and again filter.

The following improved formula is also given as a pattern for soluble extracts in general, made from essential oils:

Soluble Extract of Lemon—

Oil of Lemon, fresh,	$\frac{1}{2}$ fl.ounce
Magnesium Oxide,	$\frac{1}{4}$ fl.ounce
Calcium Hydroxide,	30 grains
Cologne Spirit,	9 fl.ounces
Water,	8 fl.ounces

Dissolve the oil of lemon in 4 ounces of the cologne spirit and rub in a mortar with the magnesium oxide and calcium hydroxide to a smooth mixture, put this in a pint bottle, add 4 ounces of water, stop and heat by a water-bath moderately for 2 hours, then pour the contents of the bottle upon a filter and, after the liquid has disappeared put the contents of the filter again into a bottle, add to it 5 ounces of cologne spirit and 4 ounces of water heat moderately on a water-bath for 1 hour, pour upon a filter and mix the filtrate with the previously filtered liquid; finally add through the filter enough water to make the measure 16 fl.ounces.

Other soluble extracts may be made from flavoring oils after the same formula, but it may be necessary to use a little magnesium oxide with some. Orange requires more than lemon.

Birch Beer Extract. Oil wintergreen 3 fl.ounces, oil sassafras $\frac{1}{2}$ fl.ounce, oil lemon $\frac{1}{2}$ fl.ounce, oil of cassia 10 minims, catechu 60 grains, magnesium oxide 3 ounces av., calcium hydroxide 2 drachms, caramel coloring 2 fl.ounces, cologne spirit $4\frac{1}{2}$ pints, water, q. s., or 4 pints. Dissolve the oils in the cologne spirit, rub the magnesium oxide with 4 pints of the boiling water, add the caramel and catechu, and add the mixture to the solution, let stand several days, with occasional agitation, then filter.

This soluble extract is much used by bottlers and for flavoring soda water syrup.

For birch beer charged in a fountain or bottled, mix 6 ounces with $1\frac{1}{2}$ gallons of syrup, 2 ounces of caramel, $\frac{1}{2}$ ounce solution citric acid, 8 gallons of water, and charge to 30 pounds.

For birch beer syrup to be drawn from the fountain, mix 3 ounces with 1 gallon of syrup, and add $\frac{1}{2}$ ounce solution citric acid. Color with caramel.

Ottawa Beer Extract. This was formerly a proprietary preparation, but now all the leading soda water manufacturers furnish it. A good extract may be made as follows: Burdock root 1 pound, sarsaparilla 1 pound, sweet flag (calamus), 2 ounces; dandelion root 6 ounces, caramel coloring 1 fl.ounce, oil of wintergreen 2 fl.drachms, oil of

lemon 2 fl.drachms, magnesium carbonate 1 ounce, alcohol $4\frac{1}{2}$ pints, water, q. s. to make 1 gallon. Grind the drugs to a coarse powder, mix 4 pints of alcohol with 4 pints of water, make an extract by water-bath percolation, reserving the first 7 pints that pass; continue the percolation with water, evaporate the remaining percolate to 1 pint and add. Dissolve the oils in 8 fl.ounces of alcohol and add; rub the magnesium carbonate with a portion of the extract, add to the remainder and, after standing, filter.

For Ottawa Beer charged in a fountain, mix 6 ounces with $1\frac{1}{2}$ gallons syrup, 1 ounce solution of citric acid, 2 ounces caramel and 8 gallons of water, and charge to 30 pounds.

For Ottawa Beer syrup mix 3 ounces with $\frac{1}{2}$ ounce solution citric acid and 1 gallon of syrup, and color with caramel.

Peruvian Beer Extract. Fluidextract sarsaparilla compound 4 fl.ounces, oil of lemon 2 fl.drachms, oil of sassafras 2 fl.drachms, oil of wintergreen $1\frac{1}{2}$ fl.drachms, oil of spruce 1 fl.drachm, oil of nutmeg $\frac{1}{2}$ fl.ounce, magnesium carbonate 1 ounce av., caramel coloring $\frac{1}{2}$ fl.ounce, alcohol 16 fl.ounces, water 16 fl.ounces. Dissolve the oils in the alcohol, rub the magnesium carbonate with the water, add the fluidextract and caramel, then add the mixture to the solution and, after standing a few days, with occasional agitation, filter.

Directions for charging, bottling and drawing as a syrup are the same as for birch beer.

Root Beer Extract. American sarsaparilla 16 ounces, sassafras bark 12 ounces, dandelion 12 ounces, sweet flag (calamus), 3 ounces; nutmeg 2 ounces, oil of spruce 1 fl.drachm, oil of wintergreen 2 fl.drachms, oil of lemon 2 fl.drachms, caramel coloring 1 fl.ounce, magnesium carbonate 1 ounce, alcohol $4\frac{1}{2}$ pints, water sufficient to make 1 gallon. Grind the drugs to a coarse powder, mix 4 pints of the alcohol with 4 pints of water; make an extract by water-bath percolation, reserving the first 7 pints that pass, and continue the percolation with water until the drugs are exhausted; evaporate this last percolate to 1 pint and add to the reserved extract. Dissolve the magnesium carbonate with a portion of the extract, and add the remainder; then add the caramel and, after standing a few days, with occasional agitation, filter.

Directions for charging, bottling and drawing as a syrup the same as for Ottawa beer.

Spruce Beer Extract. Oil of hemlock, pure, 4 fl.drachms, oil of lemon 1 fl.drachm, oil of wintergreen $\frac{1}{2}$ fl.drachm, oil of sassafras $\frac{1}{2}$ fl.drachm, magnesium carbonate 1 ounce, alcohol 20 fl.ounces, water 12 fl.ounces. Dissolve the oils in the alcohol, rub the magnesium carbonate with 12 ounces of boiling water and add to the solution; let stand for a few days, with occasional agitation, and filter.

Directions for charging, bottling and drawing as a syrup the same as for birch beer, except that the color is omitted.

Soluble Extract of Ginger. Jamaica ginger root, moderately fine powder 4 pounds; alcohol and water, sufficient quantities; magnesium carbonate 3 ounces, sodium carbonate (sal soda), 1 ounce. Pack the ginger in a water-bath percolator and pour sufficient alcohol upon it to cover it, let stand 48 hours in a warm place, then add more alcohol, heat moderately for 1 hour and begin to percolate, adding alcohol through the percolator and continuing the percolation until the drug is exhausted. Reserve the first 4 pints that pass, and concentrate the remainder by distilling off the alcohol until only a pint of the extract remains; add this to the percolate reserved. Dissolve the sodium carbonate in 4 pints of water heated to the boiling point; rub the magnesium carbonate to a smooth mixture with the solution and add the mixture to the extract. Let stand for several days in a warm place, with occasional agitation, and finally filter.

This is about half the strength of a fluidextract, and makes a clear solution with syrup or water. It is used for flavoring syrup for soda water, ginger beer and other beverages. For making the U. S. official syrup of ginger, mix 1 fl.ounce of this extract with 15 fl.ounces of syrup, making a clear syrup of ginger.

Ginger Ale Extract. Jamaica ginger, moderately fine powder, 4 pounds, Canada snake root (asarum), 4 ounces; oil of orange 3 fl.-drachms, oil of lemon 1 fl.ounce, oil of pimento 1½ fl.drachms, magnesium carbonate 4 ounces, sodium carbonate 1 ounce, caramel coloring 2 fl.ounces, alcohol and water, sufficient quantities. Pack the ginger in the water-bath percolator and pour sufficient alcohol upon it to cover it, let it stand 48 hours in a warm place, then add more alcohol, heat moderately for 1 hour and begin to percolate, adding alcohol to the percolator, and continuing the percolation until the drug is exhausted. Reserve the first 4 pints that pass, and concentrate the remainder by distilling off the alcohol until only a pint of the extract remains. Add this to the percolate reserved, then add the oils to the same. Dissolve the sodium carbonate in 4 pints of water heated to the boiling point, rub the magnesium carbonate with the solution, add the caramel coloring and then add the mixture to the extract. Let stand several days, with occasional agitation, and finally filter.

This is the popular ginger ale extract so much used for flavoring soda water syrups and bottled beverages.

For making ginger ale to bottle or charge in a fountain, mix 6 ounces of this extract with 1½ gallons of syrup, 7 gallons of water, 1 ounce solution of citric acid and 2 ounces caramel, and charge to 30 pounds. For making syrup ginger ale to draw from fountain, mix 3 ounces of the extract with 1 gallon syrup, and add ½ ounce solution of citric acid.

Soluble Extract of Lemon. Oil of lemon, fresh, ½ fl.ounce; magnesium carbonate ¾ ounce, cologne spirit 9 fl.ounces, boiling water,

q. s., or 8 fl.ounces. Dissolve the oil of lemon in the cologne spirit, rub the magnesium carbonate with the boiling water and add to the solution, let stand a few days, with occasional agitation, then filter, adding enough water through the filter to make the measure 1 pint.

For making lemon pop etc., mix 8 ounces of this extract with 2 gallons of syrup and 8 gallons of water, add 1 ounce of citric acid, and charge to 30 pounds. For soda water syrup mix 3 ounces with 1 gallon of syrup and add 1 ounce citric acid solution.

Soluble Extract of Mead. A great number of formulas have been published for making this popular beverage, some being in the form of extracts, and others in the form of a syrup. The following makes a soluble extract of fine flavor and strength: Oil of lemon 2 fl.ounces, oil of sassafras 4 fl.drachms, oil of cloves 3 fl.drachms, oil of pimento 1 fl.drachm, oil of cinnamon 40 minims, caramel coloring 2 fl.ounces, magnesium carbonate 4 ounces, cologne spirit $4\frac{1}{2}$ pints, water, q. s., or 4 pints. Dissolve the oils in the cologne spirit, rub the magnesium carbonate with 4 pints of boiling water, and add the caramel coloring, then add the mixture to the solution and let stand for a few days, shaking occasionally, and filter.

For charging in a fountain or bottling, mix 6 ounces of this extract with $1\frac{1}{2}$ gallons of syrup, 7 gallons of water and 1 ounce solution citric acid, and charge to 30 pounds.

For making Syrup of Mead to draw from the fountain, mix 3 ounces with 1 pint of strawberry or raspberry juice and $\frac{1}{2}$ ounce citric acid solution, and add enough syrup to make a gallon.

Excelsior Mead Extract. Fluidextract sarsaparilla compound 4 fl.ounces, strawberry juice (or other fruit juice), $4\frac{1}{2}$ pints; soluble mead extract 8 fl.ounces, caramel coloring 1 fl.ounce, sugar 5 pounds, cologne spirit 12 fl.ounces. Mix the liquids and dissolve the sugar in the mixture. To charge in a fountain or make bottled mead, mix $1\frac{1}{2}$ gallons of this extract with 1 gallon of syrup and $7\frac{1}{2}$ gallons of water, and charge to 30 pounds. For Excelsior Mead Syrup to draw from the fountain, mix 1 part with 3 parts of syrup.

Soluble Extract of Orange. Oil of orange $\frac{1}{2}$ fl.ounce, magnesium carbonate $\frac{3}{4}$ ounce, cologne spirit 9 fl.ounces, water, q. s., or 8 fl.ounces. Dissolve the oil in the cologne spirit, rub the magnesium carbonate with 8 ounces of boiling water, and add to the solution, let stand a few days, shaking occasionally, then filter, adding enough water through the filter to make the measure a pint.

For making Orange Syrup for soda water, mix 3 ounces with 1 gallon of syrup and $\frac{1}{2}$ ounce solution citric acid.

Soluble Extract of Sarsaparilla. Oil of wintergreen $2\frac{1}{2}$ fl.drachms, oil of sassafras $1\frac{3}{4}$ fl.drachms, oil of anise 15 minims, magnesium carbonate $\frac{1}{2}$ ounce, cologne spirit 9 fl.ounces, water, q. s., or 8 fl.ounces. Dissolve the oils in the cologne spirit, rub the magnesium carbonate

with 8 ounces of boiling water, and add to the solution, let stand for a few days, then filter, adding enough water through the filter to make the measure a pint.

For charging in a fountain, making Sarsaparilla Pop etc., mix 8 ounces of this extract with 2 gallons of syrup, 8 gallons of water, $\frac{1}{2}$ ounce citric acid and 8 ounces caramel coloring, and charge to 30 pounds. For soda water syrup, mix 3 ounces with 1 gallon syrup and color with caramel.

Soluble Extract of Wintergreen. Oil of wintergreen 3 fl.ounces, magnesium carbonate $\frac{1}{2}$ ounce, cologne spirit 9 fl.ounces, water, q. s., or 8 fl.ounces. Dissolve the oil in the cologne spirit, rub the magnesium carbonate with 8 ounces of boiling water, and add the solution; let it stand for a few days, shaking occasionally, then filter, adding enough water through the filter to make the measure a pint.

For charging in the fountains etc., use the same as sarsaparilla. For soda water syrup, mix 3 ounces with 1 gallon syrup.

SODA WATER REQUISITES.

A great change has occurred during the past few years in the manner of making and serving soda water beverages at the fountain. Drinks were formerly drawn with as much foam as possible. White of egg, gelatin or tincture of soap bark were added to syrups, a little alcohol was sometimes added to the water before charging with the gas, and long draft tubes were devised—all for the purpose of making foamy drinks. But now this is all changed and “solid” drinks are almost altogether served; phosphate drinks have come into prominence and ice cream soda is generally dispensed at the soda fountain instead of the cream syrups that were formerly a feature, and crushed fruits are used as a dressing for ice cream at many fountains. Fruit juices, which were the basis of the fruit syrups have been partially superseded by “concentrated” fruit syrups, and the artificial fruit flavors that were much in vogue years ago are now rarely used. All these changes have been of great advantage to the quality and attractiveness of soda water beverages and, as a consequence, soda water, in favorite localities, has become a large and profitable business, not only in drug stores, but also in confectionery establishments, department stores, restaurants etc.

The following formulas represent most of the preparations now required as soda water beverages, but others may be devised from time to time and become more or less popular, according to their attractiveness and the manner in which they are introduced. With these formulas as a guide the intelligent dispenser should have no difficulty in preparing almost any combination which may be wanted.

Plain Syrup for Soda Water.

Most of the plain syrup now used for soda water syrups is purchased already made—the “Rock Candy Syrup” supplied by several manufacturers being entirely satisfactory for that purpose.

An excellent plain syrup may be made by taking granulated sugar 70 pounds, water 5 gallons. This may be made cold by putting the water first into a stone-ware crock of 12 to 15 gallons capacity and adding part of the sugar, then stirring it with a flat wooden paddle until it is mostly dissolved. The remainder of the sugar is then to be added in two or three portions, stirring continually until all is dissolved. The syrup may then be strained through a flannel bag into jugs or bottles, and put away in a refrigerator or a cool place.

Syrup may be made with the same ingredients by heating to boiling, or by percolation, special syrup percolators being now obtainable at a reasonable cost, but the stirring process is easier and quicker.

This forms the basis of all the soda water syrups; the flavors being added to it, or the fruit juices or concentrated syrups mixed with it for the fountain.

Crushed Fruits.

Soft fruit of any kind is prepared as for canning; strawberries are hulled, cherries are stoned, apricots, peaches, plums, prunes etc. are skinned and the stones removed, pineapples are peeled and cored, oranges and lemons are peeled and the seeds and coarse membrane removed; blackberries and raspberries need no treatment but washing, grapes require pulping and the removal of seeds, bananas have only to be peeled. The fruits, except berries and cherries which are to be put up whole, are then to be crushed, chopped or grated, more or less as may be required, and put into an enamelled or aluminum kettle or pan. Syrup made with 8 pounds of sugar heated with a quart of water, to boiling, is then to be poured over the fruit, using as many pounds of sugar as of fruit. The fruit and syrup is then to be heated nearly or quite to boiling, and at once put up in glass cans, which are to be filled full, sealed air-tight and laid on the side until cool; they may then be inspected and put away for future use.

Sodium benzoate 70 grains to each gallon of the prepared fruit may be added as a preservative, although if put up properly no preservative is needed.

When used these fruits are to be mixed with as much or twice as much, or more syrup. If served with ice cream soda the ice cream is to be first put in the glass or dish, the crushed fruit added, the carbonated water drawn upon it and served with a spoon. If ice cream is to be served without the soda water, the plain cream may be dressed with the crushed fruits.

Flossed Fruits.

These are an improvement over the crushed fruits and are used in the same way as a dressing for ice cream etc.

Fresh fruit is prepared as for crushed fruits and then run through a cutter similar to those used for cutting meats and vegetables. The fruit is in this manner ground to a coarse pulp which is to be mixed with its weight of sugar and heated quickly to 190°F., stirring as little as possible (enough to dissolve the sugar), and put up at once in hot glass cans, sealed, inspected etc., the same as crushed fruits. All kinds of fruit may be made up as flosses, diluted with syrup from 1 to 4 parts, and sealed in the same manner as crushed fruits.

Unfermented Fruit Juices.

Good fruit, well ripened, sound and free from mold is prepared, crushed, and the juice obtained in the usual way. The juice is then to be strained, put into a porcelain or aluminum kettle and heated to 180° or 190°F., and immediately put into large bottles, demijohns or good jugs, which have been heated by hot water or otherwise to about the same temperature as the hot juice, filled full of the juice, and immediately corked with good corks. The bottles or other containers are then to be laid on the side until cool, that the corks may be sterilized and that any leakage of air or liquid may be observed. The corks should then be well sealed with hot wax or paraffin. The packages are then to be put in a cool place and allowed to rest undisturbed for several weeks or even months, during which time all sediment subsides. The juice is then ready to rebottle in small bottles and must be carefully siphoned from the large bottles or other receptacles, avoiding the sediment. The juice thus obtained is again heated to 190°F., and put up in heated bottles filled full and well corked and sealed while cooling. The bottles are then to be laid on their side until cold, then inspected and put away in a cool place. When thus put up they will keep for any length of time (until opened) and are suitable for making fruit syrups for the soda fountain or for other purposes, 1 part of the juice being generally mixed with 2 or 4 parts of syrup.

Unfermented Grape Juice. There is a large sale for this article aside from its use in making syrups etc. It is made in the same manner as above described. The grapes should be stripped from the stem and crushed before expressing the juice. It is best made by heating the grapes in a porcelain or aluminum kettle to about 140°F. before expressing the juice. When made this way the juice is much darker colored and heavier.

Other Fruit Juices. Some fruits, as strawberry, red raspberry, currants etc., may be pressed without heating; others, as peach, plum, pear etc. are better heated before pressing. Black raspberries and blackberries are best heated with $\frac{1}{4}$ their weight of water before pressing.

Concentrated Fruit Syrups.

Many manufacturers now supply "concentrated syrups" from which the regular syrups for the soda fountain may be made by mixing with from three to five times the quantity of plain syrup. These syrups have, to an extent, taken the place of the fruit juices which were formerly so much used in making the soda water syrups and, as they keep better when opened, it is of advantage to the dealer to use them. They may be readily prepared by anyone who wishes to make them and a considerable saving can be made.

The process for making the concentrated fruit syrups is as follows:

Fresh, well-ripened, sound fruit, any convenient quantity; sugar, a sufficient quantity. Prepare the fruit in the same manner as for making fruit juices and heat it in an enamelled or aluminum kettle to about 150° to 160°F., for from 20 to 60 minutes, depending upon the kind of fruit, the object being to soften it so that the juice may be readily expressed. Some fruits require a little water added in the kettle, or may be steamed to soften them sufficiently. When properly softened or disintegrated, drain off the juice and express the pulpy residue, mixing the juices obtained, and add to each gallon 70 grains sodium benzoate and $\frac{1}{4}$ ounce white of egg, well beaten, and mixed with a portion of the juice before adding to the remainder. Heat the juice thus prepared to boiling, skim it carefully and add 12 pounds of sugar for each gallon of juice, and strain the syrup through a flannel strainer while still at a temperature of 190°F., into hot jugs or bottles, which are to be filled and corked at once, and sealed while cooling. Then set away in a cool place. As thus prepared, this syrup will keep for any length of time until opened, and then, ordinarily, until it is used up; but to insure keeping, if it is to remain open a considerable length of time, sodium benzoate, 70 grains, may be dissolved in 1 ounce of boiling water and added to each gallon when opened, or if intended to be used by those who put it up can, at first, be put into quart bottles instead of jugs or large bottles.

Concentrated syrups made in the manner described are variously named by manufacturers "True Fruit Syrups," "Liquid Fruits," etc. The following may be made, but some remarks apply to certain ones as herein noted.

Apricot.—Prepare in the manner described.

Blackberry.—Prepare in the manner described.

Cherry.—Either red or black, prepare in the manner described.

Currant.—As this jellies readily, the juice should not be boiled, but only brought to a simmer, and the sugar should not be added until the juice is removed from the fire. When the sugar is dissolved, bring the syrup up to 180°F. and put it up at once.

Grape.—When boiled with sugar this syrup jellies. The juice should be brought to a simmer and skimmed and the sugar added after

it is taken off the fire, and the heat should not be less than 180° nor more than 190°F. when it is put up.

Lemon.—When concentrated syrup is made from lemon juice, full strength, it is too sour and must be reduced about two-thirds with water, then brought just to a simmer and the sugar added, the same as for currant. The outside of a portion of the lemon peel should be grated and heated with the juice before the sugar is added. When strained it is caught on the strainer.

Orange.—The outside of a portion of the orange peel should be grated and heated with the juice before the sugar is added. When it is strained it is caught on the strainer.

Peach.—Prepare in the manner described.

Pineapple.—Prepare in the manner described.

Plum.—Prepare in the manner described.

Quince.—This syrup jellies readily and should be prepared like the currant.

Raspberry.—Red raspberry should be prepared in the same manner as described, but black raspberry jellies readily and should be prepared like the currant. It is customary to mix red and black raspberries in making the concentrated syrup, unless red or black are especially wanted. One part of black with three parts of red raspberries make a good mixture and the syrup may be known simply as raspberry.

Strawberry.—Prepare in the manner described.

Other Concentrated Syrups.

Manufacturers furnish a number of other concentrated syrups designed to be used in the same manner as the concentrated fruit syrups, by mixing with from 3 to 5 parts of plain syrup; but for the consumer it is not desirable to prepare them as they are only made stronger of flavoring than the ordinary syrups and are usually flavored with extracts. They are: Banana, Birch Beer, Chocolate, Claret, Crème de Menthe, Ginger, Nectar, Root Beer, Sherbet, Sarsaparilla, Vanilla and some others specially named.

Soda Foam.

If a soda foam is desired it may be prepared by the following formula:

Soap Bark (Quillaja), ground,	1 pound
Alcohol,	8 fl.ounces
Water, a sufficient quantity.	

Cover the soap bark in a porcelain-lined vessel with boiling water and infuse for 1 hour, then pour off the liquid and reserve. Pour fresh boiling water on the bark and again infuse, and pour off as before, repeating the operation three times; mix the decoctions obtained and evaporate to 1½ pints; to this, when cool, add the alcohol and, after

standing, filter. Add 1 ounce of this to a gallon of syrup to make it foam. Acid syrups require a larger quantity.

A still better foam, because it is nearly tasteless, may be prepared from soaproot, a species of California lily-bulb, using the same proportions and making in the same manner as the foregoing.

Fruit Acid.

Citric Acid,	4 ounces av.
Hot Water,	8 fl.ounces

Dissolve the acids in the water. This is used for giving an acid or sour taste to syrups, thereby making many of them more palatable. The quantity to be used is usually stated in the formula, but may be regulated to suit the taste.

A similar solution is made from

Tartaric Acid,	4 ounces av.
Water,	8 fl.ounces

For using in a squirt bottle as "acid phosphate," take of either one of the solutions as above, 2 ounces, water 6 ounces. Mix them. Use a little to make "phosphate" drinks by adding from a squirt bottle to the syrup before drawing the carbonated water upon it.

Fruit Juice Syrups.

For making fruit syrups from juices as prepared under fruit juices it is only necessary to mix the juices 1 part by measure with 3 parts by measure of syrup. If they are desired of stronger flavor mix 1 part of juice with 4 parts of syrup.

The following fruit juices may be prepared in the manner above described:

Apple, Apricot, Banana, Blackberry, Cherry, black; Cherry, red; Currant, red; Grape, Huckleberry, Lemon, Lime, Mulberry, Orange, Peach, Pear, Pineapple, Plum or Prune, Quince, Raspberry, black; Raspberry, red; Strawberry.

Other Soda Water Syrups.

Ambrosia Syrup. Raspberry juice or concentrated syrup, 1 pint, pineapple juice or concentrated syrup 1 pint, vanilla extract 1 fl.ounce, syrup sufficient to make 1 gallon. This is a rich, finely-flavored fruit syrup. Other fruit juices besides those mentioned may be used.

Apple Syrup. Apple essence $\frac{1}{2}$ fl.ounce, cider, sweet, 1 pint; fruit acid $\frac{1}{2}$ fl.ounce, syrup sufficient to make 1 gallon. If sweet or bottled cider is not readily at hand, use 1 fl.ounce of the essence of apple and omit it. Apple juice, unfermented, is now put up the same as other fruit juices. A syrup may be made with apple juice 1 pint, fruit acid $\frac{1}{2}$ ounce, syrup 4 pints.

Apricot Syrup. Apricot juice or concentrated syrup 1 pint, syrup 4 pints. A good syrup may be made with apricot essence 1 fl.ounce, fruit acid $\frac{1}{2}$ fl.ounce, syrup 1 gallon.

Banana Syrup. Bananas 1 pound, fruit acid $\frac{1}{2}$ fl.ounce, syrup 5 pints. Mash the bananas to a pulp, add 1 pint of water and the syrup and heat them together to boiling; strain and add the fruit acid. A good syrup may be made with banana essence 1 fl.ounce, fruit acid $\frac{1}{2}$ fl.ounce, syrup 1 gallon.

Birch Beer Syrup. Birch beer extract 3 fl.ounces, fruit acid $\frac{1}{2}$ fl.ounce, syrup 1 gallon. Mix and color with caramel.

The following may be made in the same way from extracts:

Ottawa Beer Syrup, from Ottawa Beer Extract.

Peruvian Beer Syrup, from Peruvian Beer Extract.

Root Beer Syrup, from Root Beer Extract.

Spruce Beer Syrup, from Spruce Beer Extract.

Similar other syrups may be made in the same proportion and manner as birch beer syrup. Unless the business in soda water is quite large, it is much the best way to have these in the form of syrup as above, and draw the plain soda upon them, the same as other syrups.

Blackberry Syrup. Blackberry juice 1 pint, fruit acid $\frac{1}{2}$ fl.ounce, syrup 5 pints. Mix them. This may be colored with caramel and red coloring.

Brandy Syrup. Cognac essence $\frac{1}{4}$ fl.ounce, brandy 2 pints, fruit acid 2 fl.drachms, syrup 6 pints. Mix them.

Other liquor syrups may be prepared with other liquors in a similar manner, using the distilled spirits and essences of the kind required. Borubon and rye whisky, rum and other liquors are made into syrups in this way. They are usually sold under some fancy name.

Calamus Syrup. Calamus essence 2 fl.ounces, syrup 1 gallon. Mix them.

Calisaya Syrup. Quinine sulphate 10 grains, cinchonidine sulphate 30 grains, fruit acid 2 fl.drachms, syrup 1 gallon. Dissolve the salts in 1 ounce of water and mix with the syrup. Color red with red coloring.

Calisaya Phosphate Syrup. Calisaya syrup, as above, 5 pints; fruit acid 2 ounces. Mix them. This is an excellent tonic, the valuable properties of calisaya bark being combined with phosphates compound.

Catawba Syrup. Catawba grape juice 1 pint, brandy $\frac{1}{2}$ pint, syrup 5 pints. Mix them. Other varieties of grape syrup may be made in the same manner by using other grape juices.

Champagne Syrup. Rhine wine 3 pints, pear essence $\frac{1}{2}$ fl.ounce, syrup 5 pints. Mix them.

Cherry Syrup, Red or Black. Cherry juice, red or black, or concentrated cherry syrup 1 pint, syrup 5 pints. Mix them. Made from true cherry juice, these syrups are excellent. Very good syrups may be made from the artificial extracts as follows: Black or red cherry essence 1 fl.ounce, fruit acid 1 fl.ounce, syrup 1 gallon. Mix, color to suit.

Cherry Phosphate Syrup. Concentrated solution phosphate or fruit acid 1 fl.ounce, cherry juice 1 pint, syrup 5 pints. Mix. This may be flavored stronger by adding $\frac{1}{4}$ fl.ounce cherry essence. It is a popular drink at the fountain.

Wild Cherry Syrup. Fluidextract wild cherry 8 fl.ounces, syrup 1 gallon. Or wild cherry essence 2 fl.ounces, fruit acid 1 ounce, syrup 1 gallon. Mix them.

Wild Cherry Phosphate. Wild cherry syrup as above, acid solution sufficient. Draw the wild cherry syrup in a glass, add a squirt of acid solution and draw the carbonated water upon it.

Chocolate Syrup. Chocolate, in powder, 8 ounces av.; vanilla extract 1 fl.ounce, sugar 4 pounds, water 2 pints. Liquefy the chocolate by heating with water, then add the sugar, stirring them well together until all is dissolved, strain through a wire sieve and, when nearly cold, add the vanilla, mixing them well together. Chocolate syrup should not be kept in a syrup can, but in a pitcher or bottle in the ice chest where it can be kept cool and protected from flies.

Cinnamon Syrup. Cinnamon essence 1 fl.ounce, syrup 1 gallon. Mix them.

Claret Syrup. Claret wine 2 pints, syrup 4 pints. Mix them.

Coffee Syrup. Coffee extract 8 fl.ounces, syrup 6 pints. Mix them. This syrup depends upon the strength of the coffee extract used. It may be flavored to suit with any good extract of coffee.

A prepared coffee, called the G. Washington Prepared Coffee, in the form of powder may now be had in the market. A syrup may be made with this in a similar manner as chocolate syrup. The prepared coffee 1 box, granulated sugar 2 pounds, boiling water 2 pints. For cold coffee, draw this syrup, the usual quantity in a glass, and draw the carbonated water upon it.

Egg Nogg Syrup, or Milk Punch Syrup. Brandy, Jamaica rum, each, 4 ounces; fresh cream or milk 3 pints, two eggs, corn starch 2 ounces, extract vanilla 1 ounce, syrup 1 quart. Beat the eggs and the corn starch and add the milk; heat to a custard, stirring constantly; when it thickens remove from the fire, cool, and add the brandy, rum and vanilla flavoring.

Ginger Syrup. Soluble extract of ginger 4 fl.ounces, fruit acid $\frac{1}{2}$ fl.ounce, syrup 1 gallon. Mix them. Other extracts of ginger which are not soluble may be used but they do not make as satisfactory preparations.

Ginger Ale Syrup. Ginger ale extract 3 fl.ounces, fruit acid $\frac{1}{2}$ fl.ounces, syrup 1 gallon. Mix them. This is the most convenient manner of drawing ginger ale, and gives as good satisfaction as when drawn from a separate fountain.

Grape Syrup. Unfermented grape juice or concentrated grape syrup 1 pint, syrup 3 pints. Mix them. Any grape juice may be used.

Grape Phosphate Syrup. Solution phosphates concentrated or fruit acid $1\frac{1}{2}$ fl.ounces, grape juice or concentrated grape syrup 3 pints, syrup sufficient to make 1 gallon. Mix them. This is a popular syrup. It is most generally prepared as wanted by drawing grape syrup in a glass, adding a squirt of acid solution, and drawing the carbonated water upon it.

Grape Fruit or Pomelo Syrup. The juice of grape fruit, a sufficient quantity; fruit acid, syrup, each a sufficient quantity. Obtain the juice by pressure from the grape fruit, and to each pint of the strained juice add fruit acid 1 drachm and syrup 3 pints, and mix them thoroughly.

Lemon Syrup. This is usually made with lemon essence 1 fl.ounce, fruit acid $1\frac{1}{2}$ fl.ounces, syrup 1 gallon.

If lemon juice is used for making the syrup, take lemon juice 1 pint, lemon essence $\frac{3}{4}$ fl.ounce, syrup 5 pints.

A clear syrup of lemon may be made by taking soluble extract of lemon 4 fl.ounces, fruit acid $1\frac{1}{2}$ fl.ounces (or lemon juice 1 pint), syrup 1 gallon.

Lemon Syrup from Fresh Juice. As lemons are to be had at most seasons of the year, it is best to make the syrup from freshly expressed juice, as follows: Freshly expressed lemon juice, strained, 1 pint; lemon essence $\frac{3}{4}$ fl.ounce, syrup 5 pints. Mix them. This will make a cloudy syrup, but it has the real fresh taste of the lemon. Only such quantities should be made as will be dispensed in a day or two.

Lemon syrup deteriorates rapidly, and the very best way to dispense it is to have a bottle of lemon essence, with a squirt top, a bottle of lemon juice, and a bottle of plain syrup ready at hand. The plain syrup should be kept for this and other purposes in one of the syrup cans. Draw the syrup in the glass, add the juice (some want it more acid than others), then a squirt of the essence, and draw the gaseous water upon it as usual.

The same remarks apply also to lime and orange syrups.

Lemon Phosphate Syrup. Solution phosphates, concentrated or fruit acid 2 fl.ounces, lemon essence 1 fl.ounce, syrup 1 gallon. Mix them. This drink is best prepared as wanted by adding a squirt of acid solution to the required quantity of lemon syrup, and drawing the carbonated water upon it.

Lime Fruit Syrup. Lime juice 1 pint, syrup 5 pints. This syrup is strongly acid, which is as usually wanted when lime syrup is ordered. It may be flavored more, if desired, by adding $\frac{1}{2}$ fl.ounce lime essence. It is most convenient to have a bottle of lime juice handy, and add to plain syrup when wanted, as directed for lemon syrup.

It is a feature at some soda fountains to have fresh limes in their season and press the juice of one into a glass, add syrup and draw carbonated water upon it in the usual manner.

Lime Fruit Phosphate Syrup. Solution phosphates compound 1

fl.ounce, lime fruit juice 1 pint, lime essence 1 fl.ounce, syrup sufficient to make 1 gallon. The same remarks apply to this as to lemon syrup.

Malt Tonic Syrup. Liquid malt extract 1 pint, syrup 5 pints. Mix them. A malt syrup may be made by mixing Wyeth's Malt Extract or "Best Tonic" 1 pint, with 5 pints of syrup.

Maple Syrup. Maple syrup may be used, or maple sugar $3\frac{1}{2}$ pounds, water 1 quart. Dissolve by the aid of heat. A maple flavoring is prepared of which 1 ounce may be added to 5 pints of syrup and colored with caramel. It makes a very satisfactory syrup.

Nectar Syrup. Vanilla extract 2 fl.ounces, pineapple juice or concentrated syrup 1 pint, raspberry juice or concentrated syrup 1 pint, syrup 1 gallon. Mix them.

Nectarine Syrup. Nectarine extract 1 fl.ounce, fruit acid $\frac{1}{2}$ fl.ounce, syrup 1 gallon. Mix them. This may also be made from nectarine fruit juice when it can be obtained, in the same manner as other fruit syrups.

Noyau Syrup. Essence of orange 1 fl.ounce, essence of bitter almond 1 fl.ounce, fruit acid $\frac{1}{2}$ fl.ounce, syrup 1 gallon. Mix them.

Orange Syrup. Orange essence 1 fl.ounce, fruit acid $\frac{1}{2}$ fl.ounce, syrup 1 gallon. Mix them. If orange juice is used for making the syrup, take orange juice or concentrated syrup 1 pint, orange essence $\frac{3}{4}$ fl.ounce, syrup 5 pints.

It may also be made with soluble extract of orange 3 fl.ounces, fruit acid $\frac{1}{2}$ fl.ounce, syrup 1 gallon. This syrup deteriorates by standing and may best be dispensed by adding a dash of essence orange and fruit acid to plain syrup in a glass and drawing carbonated water upon it.

Orange Syrup from Fresh Juice. As oranges are to had at most seasons of the year, it is best to make the syrup from freshly expressed juice as follows: Freshly expressed orange juice, strained, 1 pint; orange essence $\frac{3}{4}$ fl.ounce, fruit acid $\frac{3}{4}$ fl.ounce, syrup 5 pints. Mix them. This will make a cloudy syrup, but it has the real fresh taste of the orange fruit. It should be freshly made every day to be in the best condition for serving.

Orange Phosphate Syrup. Concentrated solution phosphates 2 fl.ounces, orange essence $1\frac{1}{2}$ fl.ounces, syrup 1 gallon. Mix them. This drink is usually served by adding a squirt of acid solution to the required amount of orange syrup in a glass, and drawing the carbonated water upon it.

Maltese Orange Syrup. Red Orange of Malta Syrup — Blood Orange Syrup. Orange essence $1\frac{1}{2}$ fl.ounces, fruit acid $\frac{1}{2}$ fl.ounce, syrup 1 gallon. Mix them and color red with red coloring. This may also be made by coloring regular orange fruit syrup with red coloring.

Orgeat Syrup. Orgeat essence 1 fl.ounce, syrup 1 gallon. The plain bitter almond syrup is frequently dispensed under this title.

Peach Syrup. Peach juice or concentrated syrup 1 pint, syrup 5 pints. Mix them. A very good syrup may be made from peach essence 1 fl.ounce, fruit acid $\frac{1}{2}$ fl.ounce, syrup 1 gallon. Mix them.

Pear Syrup. Pear juice or concentrated syrup 1 pint, syrup 5 pints. A very good artificial pear syrup may be made with pear essence 1 fl.ounce, fruit acid $\frac{1}{2}$ fl.ounce, syrup 1 gallon. Mix them.

Phosphate Drinks.

Phosphate drinks are now extensively served at all good fountains. It is not advisable to keep syrups made up of each kind required, but rather a squirt bottle containing an acid solution from which the "phosphate" can be added to the kind of syrup ordered. The fact is that acid phosphate is not a suitable addition, as it leaves a hot, unpleasant feeling in the throat after drinking. Tartaric acid solution is the best that can be added to make phosphate drinks. One pound of tartaric acid may be dissolved in 1 pint of water for a stock solution. Of this 3 ounces mixed with 8 ounces of water may be taken for the squirt bottle and the dispenser soon learns how much to use for a glass. The flavored syrup is drawn in the glass, the "phosphate" solution added and the carbonated water drawn upon it "solid," it is then stirred with a spoon and served to the customer either with or without a straw.

Phosphate Syrups.

A great variety of "phosphate syrups" may be made by combining the acid solution with various fruit syrups etc. The principal ones have been mentioned under the heading of Syrups, with which the combinations are made. The "phosphate syrups" are much in demand and take well wherever introduced. It is unnecessary to keep them made up except in large establishments as the "phosphate solution" may be added as directed in the preceding article.

Pineapple Syrup. Pineapple juice or concentrated syrup 1 pint, fruit acid $\frac{1}{2}$ fl.ounce, syrup 5 pints. Mix them. A fair syrup of pineapple may also be made with pineapple essence 1 fl.ounce, fruit acid $\frac{3}{4}$ fl.ounce, syrup 5 pints. Mix them.

Pineapple Phosphate Syrup. This is best made as wanted, by adding a squirt of acid solution to the required quantity of pineapple syrup in a glass, and drawing the carbonated water upon it.

Plum or Prune Syrup. Plum or prune juice or concentrated syrup 1 pint, syrup 5 pints. Mix them.

Quince Syrup. Quince juice or concentrated syrup 1 pint, fruit acid $\frac{1}{2}$ fl.ounce, syrup 5 pints. Mix them.

Raspberry Syrup, Red or Black. Raspberry juice, red or black, or concentrated syrup, 1 pint; syrup 5 pints. Mix them. The red raspberry syrup is considered the finest flavor of any of the fruit syrups.

Black raspberry syrup has a much different flavor and a very dark color. A mixture of the two makes a fine syrup.

Raspberry Phosphate Syrup. This is best made as wanted, by adding a squirt of acid solution to the required quantity of raspberry syrup in a glass, and drawing the carbonated water upon it.

Roman Punch Syrup. Jamaica rum 8 fl.ounces, brandy 8 fl.ounces, fruit acid $\frac{1}{2}$ fl.ounce, Roman punch essence $\frac{1}{2}$ fl.ounce, syrup 4 pints. Mix them.

Sarsaparilla Syrup. Sarsaparilla essence $1\frac{1}{2}$ fl.ounces, fruit acid $\frac{1}{2}$ fl.ounce, syrup 1 gallon. Mix and color brown with caramel. This syrup is improved by adding 1 drachm of glycyrrhizin, in scales, dissolved in a little water. A perfectly clear syrup may be made with soluble extract of sarsaparilla 3 fl.ounces, fruit acid $\frac{1}{2}$ fl.ounce, syrup 1 gallon. Color with caramel.

Sherbet Syrup. Vanilla extract 1 fl.ounce, pineapple juice or concentrated syrup 1 pint, lemon extract, soluble, 1 fl.ounce; syrup 5 pints. This may also be mixed extemporaneously from the fountain by drawing equal parts of vanilla, pineapple and lemon or orange syrups.

Persian Sherbet. This is usually served by drawing into a glass sufficient strawberry or vanilla syrup, then adding from "squirt" bottles a few drops each of lemon extract, orange extract, fruit acid, and drawing the water upon them, or adding ice, drawing most full of water and shaking it with a shaker.

Strawberry Syrup. Strawberry juice or concentrated syrup 1 pint, fruit acid $\frac{1}{2}$ fl.ounce, syrup 5 pints. Mix them. As the color is usually deficient in strawberry juice to satisfy the popular taste, it may be colored slightly with red coloring, or by the addition of a little raspberry juice which improves its flavor.

Strawberry Phosphate Syrup. This is best made as wanted, by adding a squirt of acid solution to the required quantity of strawberry syrup in a glass, and drawing the carbonated water upon it.

Tangerine Syrup. Essence of orange 1 fl.ounce, orange juice or concentrated syrup 1 pint, strawberry juice or concentrated syrup $\frac{1}{2}$ pint, syrup 5 pints. Mix them and color orange red if necessary.

Tea Syrup. Green tea, good quality, 2 ounces, boiling water 1 pint, sugar $1\frac{1}{2}$ pounds. Infuse the tea in the boiling water, strain, add enough water to make 1 pint, then dissolve the sugar in the liquid.

Tokay Syrup. Tokay wine 2 pints, essence cognac 1 fl.drachm, syrup 4 pints. Mix them.

Vanilla Syrup. Vanilla extract $2\frac{1}{2}$ fl.ounces, syrup 1 gallon. Mix them. Vanilla syrup is one of the most popular soda water syrups. It is combined with nearly all the other syrups and, drawn with cream, is a great favorite. It is necessary that only a pure vanilla extract of

fine flavor be used for making this syrup. Inferior or mixed extracts will not draw custom.

Wine Syrups. Wine, of any kind, 2 pints, syrup 3 pints. Mix them.

Wintergreen Syrup. Wintergreen essence $1\frac{1}{2}$ fl.ounces, syrup 1 gallon. Mix them. Perfectly clear syrup may be made with soluble extract wintergreen 3 fl.ounces, syrup 1 gallon. Mix them.

Other Soda Water Syrups.

The foregoing comprise the regular syrups dispensed at the soda fountain, many of them being also useful for other purposes. Besides these, many other drinks are served in various ways in connection with the fountain.

Frappé Drinks.

These are simply iced drinks prepared by adding fruit syrup to shaved or ground ice, and drawing carbonated water upon it. In large establishments the method of serving frappé drinks is the chief attraction. The ice is ground fine by machinery and heaped up on the soda water counter in the form of a pyramid. The operator slides the edge of the glass up the side of the pyramid, getting it a quarter full of the ground ice; the syrup is then drawn upon it and the carbonated water added. In smaller establishments the ice is shaved either into the glass or kept on hand in a bowl and put in the glass with a spoon. Any of the fruit syrups may be dispensed as "frappé drinks."

Fruit Juice Drinks.

Grape juice is served at the soda water counter "plain"—that is, without carbonated water. Other juices may be served in the same way, but as yet grape juice, only, has been dispensed in this manner. Those preferring to serve a sweeter drink than plain grape juice may prepare it as follows: Unfermented grape juice 2 pints, fruit acid 1 fl.drachm, syrup 2 fl.ounces, water 1 pint. Mix them. Keep very cold and serve in small glasses in a 6-ounce glass, half full of chipped ice.

Pineapple juice, which is now put up in the same manner as grape juice, may be prepared in a similar way. Most other juices require more syrup when served in this way—from 4 to 8 ounces to a quart of the juice for orange, pineapple, strawberry or raspberry.

Orangeade Syrups. Fresh orange juice 1 pint, essence orange $\frac{3}{4}$ fl.ounce, fruit acid 1 fl.ounce, syrup 5 pints. Mix them.

Orangeade. To make orangeade take orangeade syrup 2 pints, fruit acid 1 fl.ounce, orange coloring, sufficient; syrup 1 pint, water 1 gallon. Mix the liquids and add the orange coloring. This is best served as a counter drink from a punch bowl with pieces of ice and sliced orange floating in it; or from a glass tank or cooler, without the sliced orange. It is of attractive appearance and when served cold is a very refreshing beverage.

Other —*ade* drinks may be made with other fruit syrups and fruits in a similar manner, using the fruit and coloring suited to the drink.

Ice Cream Soda.

Practically all well regulated fountains now serve ice cream with soda water. A regular ice cream, generally without flavor, is made or bought; a measure of this is put in the glass, the required flavored syrup drawn upon it, then the carbonated water, and served with a spoon. Full directions for making ice cream may be found in the article on Confectionery following this section. Any syrup may be combined with ice cream in the manner directed, the most used being chocolate, the fruit syrups and vanilla. Ice cream in dishes, without soda is served at many soda fountains. The ice cream is usually dressed with crushed or flossed fruits.

KOLA AND COCA DRINKS.

Under one or another name drinks containing kola and coca have become very popular at the soda fountain. "S. K." or Sparking Kolafr, Coca-Cola, Grape Cola and others of similar name and nature take the lead. While the following formulas make quite similar preparations, no claim is made that they are exactly like the originals.

Kolafr Extract. Kola nuts, in moderately fine powder, 8 ounces; tartaric acid 2 ounces, fresh orange peel, cut fine, 8 ounces, cinnamon, in powder, 1 ounce; cologne spirit 3 pints, water sufficient to make 1 gallon. Mix the kola, orange, cinnamon and acid together, and put them in a gallon bottle or jar, and add the cologne spirit; allow to macerate in a warm place for 12 hours and pour off the liquid, draining the bottle by inverting it over another bottle, which receives the liquid. To the drained drugs in the bottle add 5 pints of hot water, and keep in a warm place, with occasional agitation, for 24 hours, then pour off the liquid, add to the alcoholic tincture and percolate the drained drugs from the bottle with sufficient hot water to make the measure, with the mixed liquids, after standing and filtering, 1 gallon.

Kolafr Syrup. Kolafr extract, as above, 1 pint; syrup 3 pints. Mix them and color with caramel. This may be used as kola syrup.

Coca Syrup. Fluidextract coca 3 fl.ounces, essence of orange $\frac{1}{2}$ fl.ounce, lime juice 1 pint, syrup 4 pints. Mix them and color with caramel.

Coca and Celery Syrup. Fluidextract coca 2 fl.ounces, fluidextract celery 1 fl.ounce, essence of orange $\frac{1}{2}$ fl.ounce, lime juice 1 pint, syrup 4 pints. Mix them and color with caramel.

Kola and Coca Syrup. Fluidextract coca 4 fl.ounces, fluidextract kola, soluble, 2 fl.ounces; essence of orange $1\frac{1}{2}$ fl.ounces, lime juice $1\frac{1}{2}$ pints, ginger ale extract $\frac{3}{4}$ fl.ounce, cologne spirit 8 fl.ounces, sugar 6 pounds, water 3 pints, caramel coloring sufficient. Mix the

fluidextracts, cologne spirit and water, add the essence of orange and set aside, agitating occasionally during 2 days; then filter, add the lime juice and ginger and dissolve the sugar in the mixture; color with caramel coloring.

This may also be prepared by macerating cola leaves, coarsely ground, 4 ounces; and kola nuts, in powder, 2 ounces; with cologne spirit 8 ounces and water 3 pints, in a warm place for 7 days; then pouring off, expressing and filtering the liquid. To this is then added essence of orange $1\frac{1}{2}$ fl.ounces, lime juice $1\frac{1}{2}$ pints, sugar 6 pounds and caramel to color.

This syrup is used as it is, the carbonated water being drawn upon it when it is served at the fountain. The syrup should stand for some time to develop the flavor.

Other kola and coca combinations may be made in a similar manner as the foregoing.

SHAKE DRINKS.

At one time milk shake was very popular and a special apparatus was used for shaking it; but this method soon came into disfavor and now shake drinks are generally prepared in a metal lemonade shaker which fits over a glass. The following shake drinks are frequently called for:

Milk Shake Punch. This may be made by shaving ice in a glass, adding the usual quantity of vanilla or other flavored syrup, drawing part full of soda water, then nearly filling with milk and adding, if desired, a little liquor—brandy, rum, whisky or wine—then shaking in a lemonade shaker. Without the liquor this may be dispensed as Temperance Punch. An egg added is a great improvement.

Fruit Juice Shakes. Shake drinks may be made with any of the fruit juices as follows. They are similar to lemonade or other ades, and give excellent satisfaction. Plenty of ice should be used: Any fruit juice or concentrated syrup 1 fl.ounce, syrup of the same kind 2 fl.ounces. Shave ice in the tumbler and draw "solid" with soda water, shake with a lemonade shaker.

A dash of lemon essence, orange essence or lime fruit essence, added to lemon, orange or lime fruit shakes adds to their flavor and makes an attraction. By squeezing the juice from the fresh fruit into the glass, the attractiveness of the drink is much increased.

Cobbler Shakes. These are made by mixing in a small, thin glass: Wine, of any kind, 2 ounces; lime or lemon juice $\frac{1}{2}$ ounce, lemon syrup 2 ounces. Shave ice in the glass and draw solid with soda water, shaking as before directed.

Cocktail Shakes. These are made by adding to ice, shaven in a glass, brandy, rum, whisky or gin, about $1\frac{1}{2}$ ounces, syrup 1 ounce,

a dash of Stoughton bitters, and then enough soda water to fill a small glass, and shaking as directed.

A pinch of lemon peel or orange peel, twisted over, and thrown into the glass adds to the attractiveness of these drinks.

Egg Phosphate Shake. Shave the ice in a glass, add lemon or other fruit syrup 2 ounces, a dash of lemon essence, the contents of one egg, a dash of acid solution enough to make sour; draw soda water in the glass to nearly fill, and then shake as directed.

Other similar drinks with egg may be made in the same way.

NERVE FOOD AND TONICS.

Nerve foods and nerve tonics are dispensed at the soda fountain. "Acid Phosphate" is used, the original "Horsford's" being used by many druggists, but most of them making or buying in bulk a concentrated solution of phosphates compound, which may be diluted or made into a syrup as directed.

"Malto" is an acid beverage, used as a nerve tonic like acid phosphate. It is put up in bottles, sweetened and charged with gas, making a sparkling acid drink. A "Malto Syrup" is also made. It is to be diluted with 4 parts of syrup and drawn from the fountain as any other syrup. The "Acid Phosphate Syrup" will answer the same purpose as this.

"Moxie" Nerve Food is an entirely different proposition. The proprietary "Moxie" has had a large sale. A similar preparation for use at the soda fountain may be prepared and drawn as a syrup like any other syrup, as follows: Fluidextract sarsaparilla compound 6 fl. ounces, tincture of gentian compound 1 fl.ounce, sarsaparilla extract, soluble, 3 fl.ounces; concentrated solution phosphates 2 fl.drachms, syrup sufficient to make 1 gallon. Mix them.

HOT SODA DRINKS.

It is unnecessary to state that the so-called "Hot Soda Water," unlike the cold soda water, contains no gas, but is simply water heated in a tank, or water under pressure, heated in an apparatus specially designed for it.

But comparatively few druggists who have fountains run hot soda water, as the demand is not sufficiently large to pay except in central locations in large towns.

The syrups and drinks which are generally supplied are as follows:

Chocolate Syrup. Chocolate syrup is kept hot in a tank or bottle from which it can be drawn, or cold syrup may be used. A sufficient quantity, say 2 ounces, is poured or drawn in a cup, and the hot water drawn upon it. Milk or cream is usually added before drawing the water.

Chocolate syrup for this purpose may be made by melting together on a water-bath, chocolate 1 pound, vanilla chocolate $\frac{1}{2}$ pound, and adding hot syrup 3 quarts, mixing them well together.

Clam Bouillon. Clam juice 1 to 2 tablespoonfuls, hot water, sufficient. Put the clam juice into a cup or mug and draw hot water upon it to fill. Serve with salt and pepper, and a small cracker.

Clam juice may be obtained in bottled form from grocery and drug jobbers.

Coffee Syrup. Coffee extract 1 pint, syrup 3 pints. It may be served with cream or hot milk added, or plain, drawing about 2 ounces of the syrup in a cup and then drawing the hot water upon it.

A powdered extract of coffee called the G. Washington Prepared Coffee is very convenient, $\frac{3}{4}$ teaspoonful with a teaspoonful of sugar with cream and hot water to fill a cup.

Beef Tea Extract. Extract of beef 4 ounces, black pepper $\frac{1}{2}$ ounce, hot water 1 pint. Infuse the pepper with the water for half an hour and strain, then mix the beef extract with the liquid.

To make beef tea pour a tablespoonful of this into a cup, add a little salt and draw the hot water upon it.

Bouillon Cubes. These cubes are now furnished by manufacturers, so prepared that by using one cube in a cup of hot water, an agreeable bouillon can be prepared in a moment. By using one of these cubes and a tablespoonful of tomato catsup in a cup, with hot water, tomato bouillon may be served.

Hot Lemonade. Lemon juice 1 ounce, syrup 1 ounce. Mix in a cup with a dash of lemon essence and draw hot water upon it. A little liquor—whisky, brandy or rum—is sometimes added. Lime juice may be used instead of lemon.

Hot Egg Phosphate. This is a shake drink made by drawing lemon syrup 2 ounces, in a glass, adding 1 egg and a dash of acid solution. Shake well together, pour into a cup and draw hot water upon it. The hot water should not be too hot for this purpose.

Tomato Bouillon. Tomato bouillon 1 to 2 tablespoonfuls, hot water sufficient to fill a cup or mug. Serve with salt and pepper, and a thin cracker or wafer. Tomato bouillon is prepared from stock soup and tomato, properly seasoned. It is generally put up by manufacturers but may be made by mixing equal quantities of concentrated soup and tomato catsup.

PUNCH DRINKS.

A great variety of punch drinks may be made with fruit juices or concentrated syrups and flavors, either with or without wines or liquors. They may be made into a syrup and drawn from the fountain like other syrups, or served from a bottle or cooler like plain grape juice. They may also be served from a punch bowl on the soda water

counter. In this way, with slices of lemon, orange, pineapple or other fruit floating in a bowl with large pieces of ice, the drink is very attractive.

Grape Juice Punch. This may be put up as an extract for grape punch, which may be made by diluting it when a grape punch is wanted. Grape juice, unfermented, 1 gallon; pineapple juice 1 quart, sugar 1 pound, flavoring extract of lemon $\frac{1}{2}$ ounce, flavoring extract of orange 1 ounce, tartaric acid $\frac{1}{4}$ ounce. Dissolve the sugar in the mixed juices, add the acid and heat to 180°F. ; just before bottling add the flavoring extracts and put up immediately into bottles.

To make grape punch ready to serve, take 1 quart of the punch prepared as above, add to it 1 quart of water and set into an open vessel, (as a punch bowl) in ice. A few pieces of sliced lemon and orange floating in the vessel add to the attractiveness of the drink. If desired 1 quart of claret or other wine may be added to the bowl containing the punch drink.

MINERAL WATERS.

It is most convenient to keep solutions made up for the various artificial mineral waters; they can be mixed at once with the water in the fountain and charged.

These solutions are so designed that they represent one gallon of the mineral water in 4 ounces of the solutoin. Hence, to make any mineral water, for each gallon required, take of the solution 4 ounces, water 1 gallon. Mix in a fountain and charge with carbonic acid gas to 60 or 80 pounds pressure.

All the solutions do not make up clear, and some of them do not remain clear after they are made; but it is only necessary to shake them before using, as the carbonic acid, when charged, dissolves all the sediment.

Keep the solutions in dark-colored, half-gallon bottles or demijohns, in a cool, dark place. Do not forget to shake them thoroughly just before using.

Apollinaris Water Solution. Glauber's salt (sodium sulphate) 1 ounce, fine dairy salt, sodium bicarbonate, each, 3 ounces; magnesium carbonate 1 ounce, water enough to make 4 pints. Mix them, rubbing the magnesium carbonate first through a sieve. Use 4 ounces of the mixture for each gallon of water desired, and charge as directed.

Carlsbad Water Solution. Sodium sulphate 160 grains, sodium carbonate (sal soda) 40 grains, magnesium sulphate (Epsom salts), fine dairy salt, calcium chloride, each, 20 grains; iron and potassium tartrate 2 grains, water enough to make 4 pints.

Congress Water Solution. Fine dairy salt 1 pound, caustic soda 46 grains, potassium bicarbonate 40 grains, calcined magnesium 2 ounces, water enough to make 4 pints.

Friedrichshall Water Solution. Sodium sulphate 2 ounces, sodium bicarbonate $1\frac{1}{4}$ ounces, potassium sulphate $\frac{1}{2}$ ounce, fine dairy salt 1 pound, magnesium sulphate (Epsom salts) 2 pounds, calcium chloride $1\frac{1}{2}$ ounces, water sufficient to make 4 pints. Mix them. Use 4 ounces of the mixture for each gallon of water desired. Only a small portion of the salts are dissolved; it must be well shaken.

Hunyadi Janos Water. Epsom salts 28 ounces, Glauber's salt 23 ounces, fine dairy salt 2 ounces, potassium sulphate 1 drachm, calcium sulphite $1\frac{1}{2}$ ounces, water to make 10 gallons. This water is so strong of the salts that it is not expedient to make a solution, as in other waters.

Iron Water. There are in the market a great number of natural and artificial water, in which some form of iron in solution is the important medicinal constituent. These are known by various proprietary names, but a general formula may be satisfactory. Solution calcium phosphate 10 fl.ounces, soluble iron phosphate 2 ounces, sodium phosphate $\frac{1}{4}$ ounce, water sufficient to make 10 gallons. Mix, dissolve and charge in a fountain or bottle. In some of the manufactured waters a flavoring of lemon, orange or other soluble extracts are added.

Kissingen Water Solution. Sodium bicarbonate 2 drachms, fine dairy salt 1 pound, ammonium chloride 8 grains, sodium sulphate 320 grains, Epsom salts 4 ounces, sodium phosphate 26 grains, magnesium carbonate 1 ounce, water sufficient to make 4 pints. Rub the magnesium carbonate through a sieve before adding it to the solution.

Lithia Water. There are a few natural waters in which some form of lithium salts in solution are present, but most of the lithia waters sold are solutions of some lithium salt compounded with other mineral salts in solution. The following formula will give satisfaction: Lithium carbonate 2 ounces, sodium carbonate 4 ounces, sodium chloride 4 ounces. Mix the salts in 10 gallons of water and charge in a fountain, or bottle. The carbon dioxide dissolves the lithium carbonate, making a clear solution. Tablets are also prepared containing 5 grains of lithium citrate. One of these dropped in a glass of water dissolves and is taken as a dose of lithia water.

Magnesian Aperient, or Citrate of Magnesium Solution. Citric acid, magnesium carbonate, each, 8 ounces; essence lemon 4 ounces. Dissolve the citric acid in 2 pints of hot water and add the magnesium carbonate, previously rubbed through a sieve. This does not all dissolve. When effervescence has ceased, add the essence lemon, and make up the measure with water to 4 pints. Use 1 pint of this solution to each gallon of water before charging.

This makes an agreeable and effective citrate of magnesia.

Pullna Water Solution. Sodium sulphate $1\frac{3}{4}$ ounces, magnesium sulphate (Epsom salts) $2\frac{3}{4}$ ounces, sodium carbonate 40 grains, cal-

cium chloride, magnesium chloride, fine dairy salt, each, 1 drachm; water enough to make 4 pints.

Pymont Water Solution. Sodium sulphate, Epsom salts, each, 40 grains; calcium chloride 100 grains, sodium carbonate 180 grains, iron sulphate 10 grains, water enough to make 4 pints.

Seltzer Water Solution. Calcium chloride 1 ounce, magnesium chloride 3 ounces, fine dairy salt 1 ounce, sodium carbonate 4 ounces, sodium phosphate 140 grains, iron pyrophosphate 30 grains, sodium sulphate $1\frac{3}{4}$ ounces, water enough to make 4 pints. Dissolve the iron in a portion of the water, mix the other salts with the rest of the water and mix the solutions.

Spa Water Solution. Sodium carbonate 20 grains, calcium chloride 10 grains, Epsom salts 20 grains, iron sulphate 6 grains, water enough to make 4 pints.

Vichy Water Solution. Potassium sulphate 360 grains, sodium sulphate 160 grains, sodium phosphate 50 grains, fine dairy salt $1\frac{1}{2}$ ounces, sodium bicarbonate $10\frac{1}{2}$ ounces, ammonium carbonate 20 grains, water sufficient to make 4 pints.

ICE CREAM, ICES AND FROZEN FRUITS.

Ice Cream. The best ice creams are made from pure cream, without the addition of milk or water. The "separated" cream, which may be obtained by the use of a separator, is the best, as it is uniform—neither too thick or too thin. The addition of sugar (or syrup) with flavoring, if desired, is all that is necessary.

For use at the soda fountain an unflavored ice cream is generally preferred. If any flavor is used a little vanilla is best. The quantity of sugar or syrup may be varied to suit the taste. The following formula will be generally satisfactory: Fresh separated cream 4 quarts, sugar 2 pounds (or syrup 1 quart), flavoring, if wanted, a sufficient quantity. Stir the sugar into the cream, (or mix the syrup with it), add flavoring if desired, pour the mixture into a 6-quart freezer and freeze in the usual manner. This will make 6 quarts of frozen cream, as it "swells" some in freezing.

Ice cream as thus prepared never gets very hard, but is of fine texture. Any proportion of milk may be mixed with the cream, and the ice cream will be harder and coarser in proportion to the quantity added.

A very fluffy ice cream may be made by using gelatin with the mixture. It "swells" more than the regular cream and is, therefore, cheaper for the same bulk. It may be prepared as follows: Gelatin 2 ounces, fresh cream 3 quarts, sugar 2 pounds, milk 1 quart, flavoring as desired. Soak the gelatin in the milk for an hour or two, then heat, dissolve and strain; mix with the cream, sugar and flavoring and freeze in a two-gallon freezer. This will make rather more than 6 quarts of cream.

Fruit Creams.

Any kind of fruit creams may be prepared by mixing the fresh fruits, before freezing, with the ice cream body as above prepared, the proportion of the fruit to the cream may vary from 1:2 to 1:4. The fruits must be mashed, grated or otherwise made fine before adding to the ice cream, and more sugar is generally required.

Fruit Ices.

These are prepared with the juices of fruits, sweetened, diluted with water and frozen. Lemon ice and orange ice are the ones usually served, but others may be made from other fruits if desired. The following formulas will be sufficient:

Lemon Ice. Take fresh lemon juice, strained, 1 pint; sugar 2 pounds, water 5 pints. Mix, dissolve the sugar and freeze. If boiling hot water is poured upon the lemon peel of the lemons from which the juice has been squeezed and allowed to cool, and used as a part of the water taken, a fine lemon flavor will be obtained.

Orange Ice. Orange juice 2 pints, lemon juice 4 ounces, sugar $1\frac{1}{2}$ pounds, boiling water $3\frac{1}{2}$ pints. Strain the juices, pour the boiling water upon part of the orange skins from which the juice was obtained, allow to cool and mix it with the strained juice; dissolve the sugar in the liquid and freeze.

Pineapple Ice. Pineapple juice 2 pints, lemon juice 4 ounces, sugar $1\frac{1}{2}$ pounds, water 3 pints. Mix, dissolve the sugar and freeze. Other fruit juices may be prepared in a similar manner.

Cream Sherbet. The juice of 4 medium-size oranges and 3 lemons, sugar $1\frac{1}{2}$ pounds, cream 1 quart, milk 1 quart. Stir the juices with the sugar, add the cream and milk and freeze the mixture. By adding the grated outside peel of two oranges and one lemon before freezing the flavor will be greatly improved; grated pineapple added is also an improvement.

Frozen Fruits.

These may be prepared by mashing or grating fresh fruits, adding a sufficient quantity of sugar and as much water as was taken of the fruit pulp, and freezing in the same way as fruit ices preceding. Strawberries, oranges, peaches, pineapples and other fruits or a mixture of fruits may be made up in this manner and make very attractive ices.

CANDIES AND FINE CONFECTIONERY.

Many druggists find it advantageous to make up and keep on hand a line of fine candies and confectionery. They are no more difficult to make than many other preparations and sell readily and at a better profit than most of the goods druggists handle. They are attractive window or show case goods and go nicely with soda fountain trade.

By making them themselves, druggists are always sure of having a good quality and fresh. The following formulas will suffice for most of the demand in that line.

Butter-Skotch. One cup sugar, one cup molasses, one-half cup butter, one tablespoonful vinegar, pinch of soda. Boil all together until done. Pour into buttered pans and cut into squares when cold, then wrap in buttered paper.

Butter-Skotch No. 2. Two cup sugar, two tablespoonfuls water, butter size of an egg. Boil together without stirring until it hardens on the spoon. Pour into buttered plates and cut in squares, wrapping in paraffin paper.

Butter-Skotch No. 3. Three pounds "A" coffee-sugar, one-quarter pound butter, one-half teaspoonful cream of tartar, extract of lemon or vanilla sufficient to flavor. Boil as in preceding receipts.

Candied Pop Corn. Put into a porcelain-lined kettle one tablespoonful of butter, three tablespoonfuls of water and one coffee-cup of white sugar. Boil until just ready to "snap" when dropped into cold water, then pour in three quarts of evenly popped corn. Take the kettle from the fire and stir the contents until cooled a little, and you will find each grain separate and crystallized with sugar. Take care that the corn is not burned.

Vanilla Caramels. Four cups granulated sugar, one cup molasses and $\frac{1}{2}$ cup water. Boil, stirring most of the time until the mixture hardens in cold water. Add one cup rich sweet cream and butter the size of an egg. Let it boil up again until it hardens in cold water, then remove from the fire and flavor to taste—usually about three teaspoonfuls of vanilla, but some extracts are stronger than others. Pour into a buttered pan until the candy is about $\frac{3}{4}$ of an inch thick. Let it cool, cut up into squares and wrap in paraffin or buttered paper. This receipt can be changed into numerous varieties by change of flavoring.

Chocolate Caramels. Like the above receipt, adding $\frac{1}{4}$ pound of Baker's chocolate, grated fine.

Nut Caramels. Same as above, only add two cups of hickory-nut meat or walnuts or almond meats, just before removing from the stove.

Cocoanut Caramels. After the caramel is poured out in the buttered pan, sprinkle cocoanut over the top. When it is to be used it should be slightly warmed by setting a basin containing it in warm water which softens it and it can then be molded into any desired form.

Cocoanut Candy. One fresh cocoanut, carefully grated; $1\frac{1}{2}$ pounds granulated sugar. Put sugar and milk of the cocoanut together and heat slowly until the sugar is melted. Boil for five minutes, add the cocoanut and boil ten minutes more. Stir continually to avoid burning. Pour out on buttered plates and, when cool enough, cut into squares. This candy will not be ready for use before two days.

Cream Candy Bases.

The delightful creams such as chocolate, date and others, are made in two ways. The ordinary creams, made of confectioners' sugar, without cooking, are certainly less trouble, but also not near so dainty and melting. The following is the receipt:

Uncooked Creams. In one glass put the white of one egg, in another the same quantity of water. Mix them together in a bowl and sift in confectioners' sugar, stirring constantly. When stiff as dough, knead it; the more you knead it the smoother the cream will be. Divide into three parts. Flavor one part with vanilla and color pink with rose syrup. Flavor the other part with lemon and the third with vanilla and color with grated chocolate. Put chopped nuts in some, cocoanut in others. Make some into balls with halves of English walnuts on both sides. In short, make into any form to suit your fancy, using dates and other dainties. Thus you will have confectioners' creams.

Cooked Creams are made thus: In a saucepan put two pounds of granulated sugar and one-half cup of sweet cream. This candy must be made in a double boiler, or in a pan that is set into a larger one that contains water, as it is easily burned. Boil, trying it all the time by dropping from a spoon into cold water. When it begins to harden take it quickly from the stove, pour into a buttered bowl and let it cool just a little. When luke-warm beat it until it thickens and turns into stiff cream. It will soon be stiff as dough. It is then called "**foundant**" and may be kept for a long time. It is the foundation of all creams and may be used for the following and many other combinations:

Cream Chocolates. Make into little balls, let them harden, dip into melted chocolate, set in a buttered pan to dry and in 48 hours they are ready for use.

Cream Dates. Put a strip of the foundant into the date where the seed was. Cream fruits may be made from soft fruits in a similar manner.

French Candy. White of egg 2 ounces, water 2 ounces. Put into a large bowl and beat them well together; add 2 fl.drachms of vanilla extract and sift into the beaten mixture 2 pounds of powdered or confectioners' sugar, stirring it well while adding and beating it thoroughly together. This is the foundation of the French candies and may be used for stuffing dates, figs etc., or may be made up into balls or forms for nuts, or chocolate creams which are made by dipping the balls or cones into melted chocolate and taking them out with a fork and placing on paraffin paper to harden.

Walnut Creams. Make into a ball and put walnut halves or halves of almonds or figs on the flattened balls. Chop nuts and raisins together and roll into balls with the cream, if desired.

Crystallized Oranges and Grapes. Divide ripe oranges into sections, carefully remove the seeds. Fasten one section at each end of a long thread until you have enough. Make a syrup by boiling white sugar and a little water to a point where it will thread, then dip two of the orange sections in and suspend over a stick laid across two chairs for the candy to harden. Proceed thus until all are done. When hard cut off the threads. Grapes and cherries are dropped in and lifted out with a spoon on to a buttered plate.

Green ginger root or sweet flag may be strung on threads and prepared in the same manner as orange.

Fruit Glaces. Take two quarts of granulated sugar and one pint of cold water, stir them together in a large sauce pan and boil briskly until a little dropped into cold water becomes at once as brittle as glass. This is what is called boiling to a "crack." When it is just right, as described, take it off the fire and at once dip into it the fruit you desire to cover, and at once remove it with a fork, on to greased pans or plates.

Any kind of pulpy fruit, like cherries, grapes, oranges, figs, peaches, plums etc., or the meats of nuts, raisins etc., may be "glaced" in this manner but only sound, firm, whole fruit should be taken, and it must not be broken so that juice will exude. Fruit thus prepared is very handsome and makes elegant confectionery which commands a good price.

"Fudge." Granulated sugar two cups, milk one cup, butter, size of a walnut. Place on a hot fire and when the mixture reaches the boiling point (without stirring) add, according to taste, from $\frac{1}{4}$ to $\frac{1}{3}$ cake Baker's chocolate, then stir constantly until it hardens in water; then remove immediately, adding and stirring in a little vanilla. Beat constantly with a spoon until it commences to thicken, then pour quickly into a buttered pan. If desired, coarsely chopped nuts may be added.

Hickory Nut Candy. One cup hickory nut meats, two cups light-brown sugar, half a cup of water. Boil sugar and water without stirring until thick enough to spin a thread as you drop it from a spin. Flavor it and set off the stove into a pan of cold water. With a strong spoon stir it rapidly until white, then pour in the nuts. Turn out the mixture into a buttered pan, and when cold cut into small squares.

Maple Cream Candy. Take half as much water as maple sugar, cook without stirring, and when nearly done put in a piece of butter the size of a walnut. Try it in cold water, and when it begins to harden stir rapidly until it becomes a waxy substance. Set the kettle off the stove, and when the candy cools enough to handle, make it into small balls and put halves of English walnuts on either side, putting them on greased plates to cool.

Marsh-Mallows. Dissolve one-half pound of gum arabic in one pint of water, strain, and add one-half pound of fine sugar. Place over the fire, stirring constantly until the sugar is dissolved and all is the consistence of honey. Add gradually the whites of four eggs, well beaten. stir the mixture until it is thin and does not adhere to the fingers. Flavor to taste with vanilla and pour into a tin slightly dusted with powdered starch, and when cool divide into small squares.

Molasses Candy. Three cups of yellow coffee-sugar, one cup common molasses, one cup of water, half teaspoonful of cream tartar, butter the size of a walnut. Pour the cold water on the sugar, then add the molasses, and let them boil until brittle, adding cream tartar just as you pour into buttered pans. When cold, pull until light-colored.

Neapolitan Nougat. Cover two ounces of fine gum arabic with four ounces of water and let stand, stirring occasionally for one hour. Then heat on a water-bath, stirring occasionally, until the gum is dissolved; strain, and add eight ounces of icing sugar and one-half pound strained honey and heat over the fire, with constant stirring until white and stiff. This will require some little time. Remove from the fire, flavor with a teaspoonful of vanilla, or orange flower water. Beat well for a few minutes, then pour the mixture on the well-beaten whites of four eggs, beating them together as added. To this now add one-half pound of blanched sweet almonds, six bitter almonds, two ounces of English walnuts and two ounces of glaze cherries. Cut into squares.

Taffy. One cup molasses (common or New Orleans), one cup sugar, butter the size of an egg, a tablespoonful of vinegar. Boil but do not stir until it hardens when dropped from a spoon into a little cold water. It is then done and just as you remove the kettle from the stove stir in a small teaspoonful of soda, then pour into buttered pans, and when cool enough to handle pull it until white. Cut into squares or cakes. Flavor with lemon or vanilla.

Another Taffy Candy. To four pounds of white sugar add one quart of water, place over a clear fire, stir until the sugar is dissolved and boil it to the "crack;" when the sugar is in the "ball" add half a pound of good sweet butter cut in pieces, stir until the butter is melted and thoroughly incorporated in it. Flavor with extract of vanilla or lemon and when cooked to the "crack" pour it upon a buttered marble slab, and when cool enough cut into squares or tablets.

Cream Taffy. Three cups granulated sugar, one-half cup of vinegar, one-half cup of water, butter the size of a walnut. Boil without stirring until it hardens when poured from the stirring spoon into a cup of water. Flavor and pour into a buttered pan. When cool pull until white, then cut into sticks with sharp scissors.

Another Cream Taffy. Another very fine and rich cream taffy is made by boiling the sugar with milk, or part water and part cream,

instead of all water; using granulated sugar and flavoring highly with extract of vanilla or lemon, the proportion of ingredients being the same as in the foregoing formula. These taffies may be flavored with chocolate, coffee, ginger, rose or any fruit juice, and may be made of maple or light-brown sugar, according to the taste of the maker.

LOZENGES.

Medicinal Lozenges.

All kinds of medicinal lozenges may be made in the same general manner as the following by adding the medicinal ingredients in the right proportion, and working them well into the mass. See Part II., page 1088. The following general formula will do for all as a sample:

Ordinary Peppermint Lozenges. For 28 pounds of powdered confectioners' sugar, after making a bay in the center of the sugar, placed on a slab, pour into it 2 quarts of thick gum mucilage; on that pour 1 ounce of the best American oil of peppermint; work these well together. When sufficiently mixed, stir in the sugar from all around the sides of the bay and make the whole into a stiff paste with as much of the sugar as can be used, and keep it ready on the mixing slab, with a damp, clean cloth covered over it, ready for use. Take from the bulk about 2 pounds in weight and work it with the hand into a compact, square piece, keeping it free from sticking on the slab with powdered starch; then proceed to roll and cut it into the shapes desired. The cuttings left on the slab from each sheet of paste must be mixed with the portion taken from the mixture to continue the process, until the whole is used up. This is an example for peppermint, cinnamon, sassafras, spearmint, wintergreen, or any other kind of lozenges in which an essential oil is used as a flavoring.

CHEWING GUMS.

Formerly spruce gum, Burgundy pitch and paraffin were used as bases for chewing gums, but now the Gum Chicle of commerce, otherwise known as Balata, Tuno gum, Zapota gum, and by other native names, is almost exclusively used. It is the dried, milky juice of the Sapota muelleri or Bully tree, a native of Guinea, and is similar to gutta percha, but more elastic. It also resembles caoutchouc in its properties, but is more plastic and is readily kneaded when warm. With these characteristics it is an ideal base for chewing gums, and needs only to be made attractive to the palate by the addition of sweetening and flavor. The following general directions for preparing this gum are given:

Gum Chicle,	1 pound
Powdered Sugar,	2 pounds
Flavoring, sufficient.	
Other Ingredients, as may be desired, sufficient.	

The gum chicle is to be coarsely powdered and triturated with 1 pound of the sugar, and the powder sifted through a coarse sieve. The remainder of the sugar is then to be mixed intimately with the powder, and heated in a basin on a sand-bath until the mass softens upon stirring. It is then to be well worked, the flavoring oils and other ingredients (if any) added, and well worked by kneading into the mass, then transferred to a marble or porcelain slab sprinkled with powdered sugar. It is then to be rolled out into thin sheets like pie crust, using a little powdered sugar as a dusting, and while still warm cut into flat sticks of the required size with a knife or roller wheel. In a large way kneading machines are used for mixing the gum with the sugar etc., and other machines for rolling, cutting etc.

The quantity of flavoring. If essential oils are used for flavoring, as peppermint, spearmint, wintergreen, cassia, pennyroyal, sassafras etc., or a mixture of oils of a similar kind, 1 to 1½ drachms are required for flavoring each pound of the finished gum. Some of the weaker flavoring oils, as lemon, orange, lime etc., require more, and some of the stronger, as rose, almond etc., require less. If extracts are used, as extract vanilla, ginger, orris (violet), etc., ½ ounce will be required for each pound.

Pepsin Gum. Pepsin gum may be made by incorporating ½ ounce of powdered pepsin with each pound of the gum basis before adding the flavor. This gum is extensively used for dyspepsia and stomach troubles.

Kola or Kolafrä Gum. This may be made by mixing 1 ounce of finely powdered kola nut with the gum before adding the flavoring ingredients. This is an excellent gum for bicycle riders on account of the sustaining qualities of kola. Powdered cola may also be incorporated with the gum mass in the same manner.

Black Gum. Some of these contain powdered extract of liquorice which may be mixed in the proportion of 1 ounce to each pound of the gum basis. Black pitch is also used sometimes in black gum; it has a taste of tar and may be chewed for coughs, colds etc.

Flavorings for Gums. A great variety of flavorings are used for making chewing gums, and may be compounded from the essences and solutions previously given in this work. Spearmint, peppermint and wintergreen are favorites; almond, cinnamon, clove and sarsaparilla are frequently used. Cachou flavoring is a favorite for perfuming the breath. Some of the synthetic solutions, as vanilla, rhodinol, coumarin etc. may be used to advantage, either alone or combined with flavoring oils. Coloring substances are frequently added, as for making blood orange and chocolate chewing gums.

Anyone desiring to make chewing gum will have no difficulty in producing a highly satisfactory product if the foregoing directions are carefully followed.

PART VI.

SPIRITOUS LIQUORS,

WINES AND CORDIALS

Spiritous Liquors and Wines are quite an important part of the articles sold and used by druggists, and Cordials, which may be classed with them, are considerably in demand. The following formulas are given with the intention of showing the composition of the articles named, but the government restrictions prohibit the manufacture and sale of spiritous liquors without a rectifiers license.

SPIRITOUS LIQUORS.

Spiritous liquors are prepared from saccharine or starchy substances subjected to fermentation, by which the sugar or starch are decomposed and changed into alcohol, carbon dioxide and a small percentage of other products. The carbon dioxide liberated causes effervescence in the liquid and escapes as a gas into the atmosphere; the alcohol remains in the liquid and is recovered by distillation and purified, if necessary, by various processes.

Fruit and other juices, grains of various kinds, or any substances which contain sugar or starch in abundance, may be used in making spirits. In this country brandy, distilled from wines or fermented grapes, apples etc., rum, distilled from fermented molasses or sugar-cane juice, and whisky and gin, distilled from fermented grains or other substances containing starch, are the liquors chiefly used; but in other countries liquors containing alcohol are made from various substances, as rice, the juice of cactus, potatoes etc.

The general process of making spiritous liquors is briefly described under Alcohol in Part II., page 402. For the special processes and

treatment of various substances for the production of spirits or alcohol our readers are referred to standard works upon that subject. The following brief suggestions may be of interest:

Brandy. Brandy is distilled from fermented grape juice known as wine, or the fermented pulp and juice of grapes; the best varieties being known as Cognac, obtained from the South of Europe; good brandy is also produced in this country. A brandy is also obtained from cider, which is familiarly known as "Apple Jack," and from other varieties of fermented fruit juices.

Brandy contains from 40 to 60 percent. of alcohol, the varieties generally sold being about 50 percent., or 100° proof.

Artificial Brandy. The high price of brandy makes its artificial production quite desirable, and fictitious brandy is often found in the market. The simplest way to make artificial brandy is to dilute cologne spirit, 190° proof, with an equal volume of pure water, adding to each gallon about 5 grains of tannic acid, 5 drops oil of cognac, 3 drops cœnanthic ether, and sufficient burnt sugar coloring to give it the desired color. This may be improved by adding 1 fl.drachm extract of orris and 5 drops essence of almond to a gallon. One ounce of syrup is sometimes added. This may also be made from the brandy essence and proof spirit, or diluted cologne spirit, as directed.

Brandy Essence. A flavoring for brandy may be prepared ready for use as follows: Oil of cognac, fine, 1 ounce; cœnanthic ether, commercial, 1 ounce; oil of bitter almond 2 fl.drachms, orris root, in powder, 16 ounces; tannin 2 ounces, cologne spirit sufficient to make 1 gallon. Macerate the orris root in the spirit for one week and percolate until 1 gallon is obtained; to this add the tannin, dissolve and filter, and then dissolve the oils and ether in the filtrate. Half a pint of this essence is sufficient for 40 gallons of brandy (1 ounce to 5 gallons), added to colored proof spirit. The true oil of cognac is very expensive, but upon this depends the fine flavor of the brandy.

Gin. Aside from whisky, gin is the most used of any of the alcoholic liquors. The spirit from which genuine gin is made is distilled from grain and malt the same as whisky, and after being properly purified by rectification, it is redistilled with juniper berries and some aromatics are afterwards added. Like whisky, the old distillers of gin have their trade secrets and make favorite brands which have become well known. Good gin is made in this country, but Holland has the reputation of producing the best in the world. In distilling gin, from 5 to 10 pounds of juniper berries are used for 100 gallons, and the aromatics are proportioned according to the variety desired to be made.

As gin is a compounded liquor it cannot be classed as artificially made like other liquors, the only difference in the distilled and the prepared gins being the use of juniper berries and the aromatic substances, instead of the oils or essences of the same.

Instead of distilled gin as above described, the following may be used and will give very good results.

Holland Gin. Cologne spirit, 190° proof, 20 gallons; pure water 20 gallons, oil juniper berries $2\frac{1}{4}$ ounces, oil of lemon 20 drops, oil of coriander 15 drops, oil bitter almonds 5 drops, oil cassia 5 drops, oil fennel 5 drops, syrup of acacia 1 gallon. Dissolve the oils in a gallon of the spirits and, having mixed the remainder of the spirit with the water, add the solution to it, then add the syrup acacia and mix them well together by agitation. After standing for some time draw off and filter clear through the filtering mixture, (see below).

London Cordial Gin. Cologne spirit 20 gallons, pure water 20 gallons, oil juniper berries $2\frac{1}{4}$ ounces, oil calamus 20 drops, oil angelica 10 drops, oil coriander 5 drops, oil cassia 5 drops, oil bitter almonds 5 drops, syrup gum acacia 2 gallons. Dissolve the oils in 1 gallon of the spirits and, having mixed the remainder with the water, add the solution and then the syrup of gum arabic, mix them well together and after standing filter clear.

Schiedam Schnapps. Make a tincture or extract by percolating gentian, bitter orange peel, agaric, galangal, centaury, each, 4 ounces; all in coarse powder, with diluted cologne spirit sufficient to make 1 gallon. Add 1 ounce of this extract to a gallon of Holland or London Cordial Gin as above.

Old Tom Gin. Oil coriander 1 drachm, oil cedar 1 drachm, oil fennel $\frac{1}{2}$ drachm, oil bitter almonds 15 drops, oil angelica 30 drops, oil juniper berries $\frac{1}{2}$ ounce, syrup acacia 1 gallon, cologne spirit, 190° proof, 20 gallons; water 20 gallons, orange flower water 1 pint. Dissolve the oils in 1 gallon of the spirit and mix the remainder of the substances as directed for London Cordial Gin. Other varieties may be made in the same general manner.

To Filter Gin and Other Liquors. When essential oils are used in compounding liquors they turn milky and must be filtered. For this purpose a mixture of burnt alum 4 ounces, white pipe clay 6 ounces, magnesium carbonate 4 ounces, potassium carbonate $\frac{1}{2}$ ounce, is put in a woolen bag or cloth and the liquor filtered through the mixture until clear.

By adding a quart of lime water to a barrel of gin the same result may often be accomplished.

To Clarify Gin or Cordials. Spirit finings for this purpose are used, and may be made by first adding 2 ounces of powdered alum dissolved in a quart of warm water to a barrel, and after thoroughly stirring, adding 1 ounce of sal soda dissolved in 1 pint of water.

By adding a quart of skimmed milk and 2 ounces of gelatin dissolved in a quart of water to a barrel of gin or other liquor and allowing it to settle, it is usually made clear, and the blackness which is liable to occur in gin is removed; 3 or 4 eggs beaten to a froth, mixed

with a gallon of liquor and added to a barrel will usually make it clear after standing.

Rum. Rum is distilled from fermented molasses or from the fermented juice of the sugar-cane. New England rum is distilled from molasses, but St. Croix or Santa Cruz and Jamaica Rum, made in the West Indies, are distilled from the juice and fragments of sugar-cane and the refuse of sugar factories. The juice, slices of pineapples and other tropical fruits are usually added to the distilled rum or mixed with the fermented liquid before distillation. Jamaica Rum is the most esteemed of any.

As found on the market the different kinds of rum are about 100° proof, but Jamaica Rum, as imported, contains from 60 to 75 percent. of alcohol. Much of the rum found on the market is artificially prepared after the manner described below.

Artificial N. E. Rum. Cologne spirit 190° proof, pure water, each, 10 gallons; butyric ether 2 ounces, acetic ether 2 fl.drachms, extract orris 2 fl.drachms, syrup 1 quart. Mix them.

Artificial Jamaica Rum. To imitate Jamaica Rum (best), a portion (from $\frac{1}{2}$ to $\frac{1}{3}$) of imported Jamaica Rum should be used, diluted to proof with cologne spirit and water, and flavored with a little essence of Jamaica Rum, about 1 ounce to 10 gallons of the finished product. A very good imitation, however, may be made as follows: Cologne spirit 190° proof, 10 gallons, essence Jamaica Rum 3 ounces, tincture catechu 2 ounces, burnt sugar coloring (caramel) sufficient. Mix them.

Artificial Santa Cruz Rum. This may best be made by mixing 1 1 gallon of genuine Santa Cruz Rum with 7 gallons of New England Rum, and adding 1 ounce of Jamaica Rum essence.

Imitation Arrack. To 12 gallons of New England or Santa Cruz Rum add 1 ounce of benzoin and 1 ounce of tolu and 1 sliced pineapple, macerate for 2 weeks and filter through a little purified talcum. The benzoin and tolu are best dissolved as much as possible in a pint of cologne spirit before adding.

Jamaica Rum Essence. Butyric ether 15 fl.ounces, acetic ether 2 fl.ounces, tincture of vanilla (alcoholic) 2 fl.ounces, extract of orris 2 fl.ounces, cologne spirit 3 ounces. Mix them.

Whisky. This is by far the most familiar and most used spiritous liquor of this country. Our distillers are famed for the production of fine brands of whisky, which, like the wines of certain houses of Europe, have their reputation at home and abroad. The production of fine whiskies is a trade secret with their manufacturers, all being similar in composition and alcoholic strength, but differing sufficiently in flavor to make them distinctive and different to experts. Whiskies are made by combining various grains with rye or barley malt etc., in varying proportions, grinding, fermenting, treating in various ways, distilling etc., but the limits of this article do not admit even of a des-

cription of the processes employed only in a general way. In the manufacture of fine whiskies from 8 to 10 quarts only are distilled from each bushel of grain used; but in making the cheaper grades of whisky, by improved processes, from 13 to 20 quarts are distilled from the mash for each bushel of grain used. Whisky improves by age and is not suitable for use until it is at least two years old. Various treatments for "ageing" whisky by agitation and otherwise are employed.

Artificial Whisky. Owing to the moderately low price of good whisky as compared with spirits, but a small portion of the amount sold is made up from cologne or neutral spirit direct; but by mixing different grades of whisky, or by mixing good high-flavored whisky with proof spirit, a great variety of cheap and moderate priced whiskies are produced. Nor is this alone the reason for mixing whiskies, for by combining some of the best grades with each other, "blends" are produced which surpass in flavor those of which they are composed when taken alone. A variety of flavoring essences or oils are also made for flavoring whiskies, but they are little used except by rectifiers.

These oils or essences are combinations of amyl and ethyl ethers as before described, and have no standard of composition, different manufacturers furnishing entirely different flavors under the same name.

A general formula for whisky made from spirits is as follows: Cologne spirit, 190° proof, 20 gallons; pure water 20 gallons, good, high-flavored Bourbon or Rye whisky 10 gallons. Mix and color with burnt sugar (caramel). For wheat whisky leave uncolored. This makes a good cheap whisky without any objectionable features. If too expensive for the use desired, on account of the addition of the good whisky, 8 ounces of any of the following essences may be used instead. The proof may also be reduced by adding more water and by the addition of 2 ounces of the beading oil it will still "hold its bead."

Bourbon Whisky Essence. Rectified fousel oil 1 ounce, acetate of amyl 4 ounces, pelargonic ether 2 ounces, extract orris 4 ounces, acetic ether 1 ounce, cologne spirit 12 fl.ounces. Mix them. Use 1 ounce for flavoring 5 gallons.

Rye Whisky Essences. Butyric ether 1 ounce, rectified fousel oil 1 ounce, butyrate of amyl 1 ounce, acetic ether 2 ounces, extract of orris, extract of vanilla, each, 1 ounce; extract of musk root 4 ounces, cologne spirit 12 fl.ounces. Mix them. Use 1 ounce for flavoring 5 gallons.

Scotch and Irish Whisky. These have a smoky flavor, which may be imitated by adding soot, or by adding a drachm of creosote dissolved in an ounce of acetic acid, or by adding 2 ounces of purified pyroligneous acid to a barrel or ordinary whisky. Many other varieties of whisky are known, as Malt Whisky, Monongahela Whisky, and a large number of popular private brands.

Bead or Beading Oil. For low proof liquors an artificial bead is required. It may be made by rubbing 1 ounce of the finest olive or almond oil in a mortar, with 1 ounce of sulphuric acid gradually added, and when entirely combined adding sufficient cologne spirit to dissolve it, about 20 ounces being necessary. Two or three ounces of this is used in a barrel.

Another beading oil, perhaps better than the foregoing, may be made with oleic acid 2 ounces, sulphuric acid 2 ounces, alcohol 32 ounces. Mix them and after standing, filter.

Another may be made by dissolving white Castile soap 4 ounces, in 8 ounces of water by the aid of heat, and adding 4 ounces of alcohol. After standing, filter. Two or three ounces of this is added to a barrel.

Rye and Rock. Good rye whisky 6 pints, water 1 pint, rock candy 2 pounds. Dissolve the rock candy by heating with the water; then add the whisky and filter. The whisky and water may also be mixed and the rock candy dissolved in the mixture cold, but it is much more expeditious to dissolve the rock candy first in the water by heat.

Tolu, Rock and Rye. Tincture tolu 2 ounces, magnesium carbonate $\frac{1}{2}$ ounce, good rye whisky 6 pints, water 1 pint, rock candy 2 pounds. Rub the magnesium to a fine powder and add the tincture tolu, triturate and gradually add 8 ounces of the whisky, rubbing them thoroughly together. Dissolve the rock candy by heating with the water and add the whisky, then mix all together, allow to stand 24 hours and filter clear. This is a much used and very good stimulating cough preparation. Dose a tablespoonful or more as required.

Tolu, Rock, Rye and Redroot. Fluidextract bloodroot $\frac{1}{4}$ ounce, tolu, rock and rye 1 gallon. Mix and after standing 48 hours, filter. The addition of the bloodroot to the tolu, rock and rye, makes a fine preparation for bronchial difficulties, coughs, colds etc.

WINES.

Wines. Natural and artificial wines are found in the market in great variety, both kinds will be considered in this article.

Pure Wines are, or should be made by the fermentation of grape or other fruit juices, by which their saccharine matter is converted into alcohol or spirit, which, if in sufficient quantity, prevents the wine from deleterious change; but if insufficient, is still further oxidized, being converted first into an aldehyde, then into acetic acid or vinegar. With light grape juices it is often necessary to add cane or grape sugar previous to or during fermentation, that a larger proportion of alcohol may be produced by decomposition of the sugar, or to add a small percentage of cologne spirit to the wine after the fermentation is completed, and before the acetic acid change has begun.

White Wines. These are made from many varieties of grapes by pressing out their juice, fermenting and treating as already described.

These wines are known by various names derived from the variety of grapes from which they are obtained, the locality where they are produced etc. In medicine imported sherry is preferred, as it contains a larger percentage of alcohol than other varieties. Our own native wines are also much used. California wines, angelica, sherry and muscatel being of good body and flavor, and catawba wines, made in the east are much esteemed.

Red Wines. Most of the red wines are made by fermenting the juice of red grapes in presence of their skins and pulp. Unlike the white wines the juice is not pressed out until the fermentation has proceeded for some time. This process secures the red color and the astringent qualities which the red wines usually possess. The favorite medicinal red wine is the Oporto or Port, but similar wines made in this country from various varieties of red or purple grapes are much used. To be like Port, sugar must be added during fermentation.

In making red wines the crushed grapes should be put into a fermenting tank which should not be more than three-fourths filled. The tank should be fitted with a canvass cover, and allowed to stand, with occasional agitation, until fermentation begins; it should not then be disturbed or stirred until active fermentation has subsided. Then the juice should be drawn off from the pomace into casks or barrels, and allowed to stand until fermentation is completed, adding a little more juice from time to time as the pomace and foam works off through the open bung at the top. When fermentation is completed the package should be entirely filled and tightly bunged, then set away in a cool place, and, after standing a few months, racked off into another clean cask, rejecting the sediment at bottom which is known as "wine lees."

Improvement of Wines. It has been found by experiment that the quality of wines may be improved and the quantity much increased in various ways.

Chaptal's process consists in the addition of sugar to the expressed juice before fermentation, which being decomposed, increases the alcoholic strength. Marble dust is then added to neutralize the excess of acid.

Dr. Gall's method is to prepare a normal must of juice mixed with an equal quantity of water, containing 0.5 to 0.6 percent. of free acid and 22 to 24 percent. of sugar, which is treated in the same manner as true grape juice.

Petiot's method of improving and increasing the quantity of wine consists of adding to the expressed juice an equal volume of water containing the same proportion of sugar as is contained in the natural juice. Then to the pulp of the grapes adding a like quantity of water sweetened in the same proportion and allowing to ferment for three days. Then pouring off and again adding the same quantity of sweet-

ened water to the same pulp and allowing to ferment as before, and finally mixing the liquids all together, thus making four times as much wine as there was of grape juice to start with, and it is claimed, equal in all respects to pure grape juice wine. Wines made in this manner have the true bouquet of pure wines, are not subject to diseases like pure wines, and mature in a few months instead of two or three years, as is required for natural wines. Yeasts prepared from favorite wines are now added to give the special bouquet desired. This yeast, in different varieties, may now be had from government stations. It should be added to the fresh must before fermentation begins in order to develop the characteristic bouquet desired.

Glycerin and sodium benzoate may be added to wines to preserve them. To preserve light wines (deficient in alcohol) they are heated to 140°F. and put up at once in bottles or casks and closely sealed; this process was introduced by Pasteur and is called "Pasteurizing" wines.

Apple Wine or Cider. The ordinary **Cider** of commerce is fermented apple juice. It may be made in the same manner as grape wine previously described, and should be treated in the same manner, by racking off after fermentation and keeping tightly bunged. **Sweet Cider** is prepared from the juice of apples before fermentation, by adding a preservative. Sodium benzoate $\frac{1}{10}$ of 1 percent. is allowable, but a less quantity is generally used, 4 ounces to a 50-gallon cask being the usual amount.

Apple Wine. An excellent wine may be made from apple juice by adding to each 50 gallons, after fermentation has nearly subsided, 25 pounds of sugar, in divided portions and allowing it to ferment out, thus increasing the alcoholic percentage of the wine. This should be made in the same manner as grape wine to which sugar is added, and should be subsequently treated in the same way. Apple wine, when properly prepared, is equal to most of the white wines made from grapes, and is considerably used in making some champagnes.

Artificial Wines.

Besides the process of improving and diluting wines above described, a great deal of wine entirely factitious is found in the market. A few formulas only can be given, and they are given as suggestions rather than formulas, for each kind of wine requires some special treatment peculiar to itself; besides on account of the low price that wine now sells for, artificial wines would not be desirable to manufacture.

Artificial White Wine. As a base for any of the artificial white wines the following may be used: Grape sugar 25 pounds, tartaric acid $\frac{1}{2}$ pound, hot water 6 gallons, cold water 19 gallons, grape pulp, fresh, 50 pounds (or common raisins 30 pounds). Dissolve the sugar

and acid in the hot water and add the cold water, add this to the grape pulp or to the raisins chopped fine, stir well together and allow to ferment for 10 or 12 days, stirring occasionally, then press and transfer the liquid to a barrel in the cellar and treat in the same manner as other wines. If necessary, after fermentation cologne spirit may be added to make up the alcoholic percentage required.

The grape pulp or raisins used will give the desired flavor to the wine according to the kind used, but if a more distinctive flavor is desired, the wine yeasts previously mentioned may be added before fermentation, or the artificial flavors or oils made for the purpose from ethers may be used as directed. In this manner angelica, muscatel, catawba, rhine wine, sherry and other varieties may be made. Champagne is artificially prepared from white wine by charging it with carbonic acid gas and bottling.

Artificial Red Wines. As a general base for artificial red wine the foregoing formula may be used with the addition of astringents, coloring substances and flavoring. The substances used for coloring are juices of fruits, as raspberry, cherry, elderberry, pokeberry etc., or decoctions of cochineal, Brazil wood, logwood etc., the former are greatly to be preferred; prunes are also frequently added. The flavorings are made from combinations of ethers etc. The astringent substances added are catechu, kino, oak-bark, tinctures of gall etc., about 1 ounce of catechu or kino being used for 10 gallons of port wine, and two to three times the quantity for clarets. Much less sugar is also required in the Bordeaux or claret wines.

Wine Essences or Extracts.

The true flavor of wines can only be obtained in a concentrated form by distilling the wines or the lees from which the juices are pressed, and separating their flavoring or oils by various treatments. These oils or essences or flavors are ethers, which result from the oxidation of alcohol radicals, chiefly of the amyl and ethyl series, and they may be artificially produced by combining various ethers obtained by the oxidation of fousel oil, potato oil etc. Their production and combination, however, is still experimental and uncertain, and it cannot be said that the true flavor of any particular kind of wine has been produced artificially, although close imitations have been arrived at, and the manufacturers claim to furnish wine essences or flavors of various kinds. The following formulas produce flavors which, added to common wines as directed in the formula for wines, will give a close imitation of the flavor of the natural wines bearing the same name. Of course wines of different localities and of different vintages differ considerably in body, color and flavor, but very good imitations of the average may be made by the formulas given. The manipulator must, in a way, use his judgment in regard to sweet-

ness, color and quantity of flavor. The wines made after the formulas improve with age, provided they are kept in full packages.

Blackberry Wine or Brandy Essence. Acetic ether 4 parts, formic ether 1 part, benzoic ether 2 parts, cœnanthic ether 1 part, amyl acetate 1 part, almond essence 1 part, essence cinnamon 1 part, essence pimento 1 part, glycerin 1 part, cologne spirit 3 parts. Mix them and color with red and brown coloring.

Catawba Wine Essence. Acetic ether 2 parts, aldehyde 3 parts, extract of orris 3 parts, cœnanthic ether 1 part, amyl acetate 1 part, glycerin 2 parts, cologne spirit 4 parts. Mix them.

Claret Wine Essence. Acetic ether 2 parts, tincture of castor 1 part, cœnanthic ether 1 part, aldehyde 2 parts, essence orris 1 part, formic ether 1 part, spirit of nitrous ether 2 parts, glycerin 2 parts, claret coloring 1 part, cologne spirit 3 parts. Mix them.

Riesling Wine Essence. Cœnanthic ether 2 parts, aldehyde 4 parts, extract orris 2 parts, ether 1 part, acetic ether 1 part, glycerin 2 parts, cologne spirit 4 parts. Mix them.

Rhinewine Essence. Acetic ether 1 part, aldehyde 4 parts, cœnanthic ether 1 part, spirit of nitrous ether 2 parts, glycerin 2 parts, cologne spirit 6 parts. Mix them.

Port Wine Essence. Acetic ether 2 parts, cœnanthic ether 2 parts, essence of pimento 1 part, aldehyde 3 parts, tincture of castor 1 part, tincture of cinnamon 1 part, glycerin 2 parts, cologne spirit 3 parts. Mix and color with red and brown coloring.

Sherry Wine Essence. Acetic ether 1 part, cœnanthic ether 2 parts, aldehyde 3 parts, tincture of orris 2 parts, tincture of castor 1 part, spirit of nitrous ether 2 parts, glycerin 2 parts, cologne spirit 3 parts. Mix them.

Tokay Wine Essence. Acetic ether 1 part, aldehyde 3 parts, essence of bitter almond 1 part, tincture of cinnamon 1 part, cœnanthic ether 1 part, amyl acetate 1 part, formic ether 1 part, spirit of nitrous ether 1 part, glycerin 2 parts, cologne spirit 4 parts. Mix them.

Tincture Catechu. Catechu 1 pound, water 1 quart, proof spirit 1 quart. Heat the water, break up the catechu and dissolve in the water, adding enough water to keep the measure, then cool, add the spirit and filter, add enough water to make 2 quarts. This is used as an astringent and to give the "pucker" taste to clarets and red wines.

Neutralizing Powder. Slaked lime and hard wood ashes, each, equal parts. Mix them and sift three or four times to get them well mixed. The best ashes to use are those gathered after burning grape brush, but good hard wood ashes of any kind will do. This is used to neutralize excess of acids in wines by precipitating tartar. The quantity to be used depends upon the acidity of the wines and must be determined chiefly by the judgment of the manipulator. Four ounces to a barrel of ordinary new wine is about right.

Tincture Kino. Kino 4 ounces, proof spirit 1 quart. Add the kino to the spirit and set aside, shake up every day until the kino is dissolved. This is used as an astringent for some kinds of red wine.

Tincture Red Gum. Red gum (eucalyptus gum) 4 ounces, diluted alcohol 2 pints. Mix and macerate until the gum is dissolved and filter. This is used as an astringent for clarets and other red wines. In combination with catechu it gives a distinguished flavor to claret and Burgundy wines. From 2 to 4 ounces may be used for a barrel. If mixed with catechu, use half an half.

Prepared Wines.

Blackberry Wine. Dark red wine 45 gallons, sugar 50 pounds, proof spirit 4 gallons, neutralizing powder 4 ounces, sodium benzoate 4 ounces, tincture red gum 8 ounces, burnt sugar coloring 1 pint, blackberry brandy essence 1 ounce. Mix, dissolve the sugar, let stand and rack off and strain.

Catawba, Dry. White wine 45 gallons, sugar 10 pounds, proof spirit 4 gallons, neutralizing powder 4 ounces, sodium benzoate 4 ounces, catawba essence $\frac{1}{2}$ ounce. Mix, dissolve the sugar, let stand, rack off and strain or filter.

Catawba, Sweet. White wine 45 gallons, sugar 50 pounds, proof spirit 3 gallons, neutralizing powder 4 ounces, sodium benzoate 4 ounces, catawba essence $\frac{1}{2}$ ounce. Mix, dissolve the sugar, let stand, rack off and strain or filter.

Cherry Wine. A good red wine, not very astringent, 45 gallons, sugar 60 pounds, proof spirit 2 gallons, neutralizing powder 4 ounces, sodium benzoate 4 ounces, essence bitter almonds 4 ounces. Mix, dissolve the sugar, let stand and strain or filter.

Claret. Very dark red wine, as astringent as you have, 45 gallons; tincture catechu 1 pint, tincture red gum 8 ounces, burnt sugar coloring q. s., about 2 pints; neutralizing powder 4 ounces, sodium benzoate 4 ounces, proof spirit 3 gallons, claret flavor or essence $\frac{1}{2}$ ounce. Mix, let stand and rack off.

Port Wine. Good red wine, not very astringent, 45 gallons; sugar 50 to 60 pounds, proof spirit 4 gallons, neutralizing powder 4 ounces, sodium benzoate 4 ounces, burnt sugar coloring q. s., about 1 pint; flavoring (port wine essence) $\frac{1}{2}$ ounce. Mix well and after standing rack off and strain.

Rhinewine. White wine 45 gallons, proof spirit 3 gallons, neutralizing powder 4 ounces, sodium benzoate 4 ounces. Mix, let stand and rack off.

Raspberry or Strawberry Wine. These wines may be made the same as blackberry by omitting the tincture of red gum and using raspberry or strawberry essence instead of blackberry.

Sherry. White wine 45 gallons, sugar 35 pounds, proof spirit 4 gallons, neutralizing powder 4 ounces, sodium benzoate 4 ounces,

sherry flavor $\frac{1}{2}$ ounce. Mix, dissolve the sugar, let stand and rack off. A dry sherry can be made by using 15 pounds of sugar instead of as above.

Tokay. White wine 45 gallons, proof spirit 3 gallons, sugar 45 pounds, neutralizing powder 4 ounces, sodium benzoate 4 ounces, tincture kino 2 ounces, tokay essence 1 ounce, burnt sugar coloring 8 ounces. Mix, dissolve the sugar, let stand and rack off.

BITTERS AND BITTERS EXTRACTS.

These extracts are used for flavoring liquors and for making bitters to bottle. They are dispensed at bars from squirt bottles, by which a few drops may be added to a glass of liquor, and are used as directed for flavoring put up bitters, for which druggists have some demand.

Angostura Bitters Extract. Angostura bark 16 ounces, bitter orange peel 8 ounces, Canada snake root 8 ounces, calisaya bark 8 ounces, Virginia snake root 8 ounces, gentian root 4 ounces, galangal root 4 ounces, sweet flag (calamus) 4 ounces, cardamom seed 2 ounces, cinnamon 1 ounce, cloves 1 ounce, coriander 1 ounce, mace 1 ounce, alkanet root 2 ounces, alcohol 6 pints, water sufficient to make 1 gallon.

Grind the drugs to a moderately fine powder and moisten them with 2 pints of alcohol, pack in the water-bath percolator and, having mixed the remainder of the alcohol with 4 pints of water, pour enough of the mixture upon the drugs to cover them, and set in a warm place; let stand 2 days, then pour the remainder of the diluted alcohol upon them, heat very moderately and, after 1 hour, begin to percolate, adding water to the drugs and continuing the percolation until the drugs are exhausted. Reserve the first $7\frac{1}{2}$ pints that pass, evaporate the remainder of the percolate to half a pint, and add to the reserved portion to make 1 gallon. This is a very strong extract.

To make **Angostura Bitters** for bottling, take 2 ounces of the above extract, $\frac{3}{4}$ gallon pure proof spirits, $\frac{1}{4}$ gallon water, 1 ounce glycerin.

Aromatic Bitters Extract. Bitter orange peel 2 pounds, sweet flag root (calamus) 8 ounces, hops 8 ounces, cardamom seed 2 ounces, cassia bark 2 ounces, coriander seed 1 ounce, cloves 1 ounce, mace 1 ounce, cochineal 1 ounce, alcohol 5 pints, water sufficient for 1 gallon.

Grind the orange and hops to a coarse powder, and the other articles to a fine powder, mix them, moisten with 1 pint of alcohol, pack, percolate, and proceed in the same manner as for making angostura bitters extract. This is a pleasant aromatic extract.

To make **Aromatic Bitters** to bottle, mix 4 fl.ounces of this extract with 6 pints pure proof spirit and 2 pints water, and add 1 ounce glycerin.

Bowker's Bitters Extract. Quassia 8 ounces, sweet flag root (calamus) 8 ounces, bitter orange peel 12 ounces, catechu 4 ounces, car-

damom 3 ounces, alcohol 5 pints, water sufficient to make 1 gallon. Make by water-bath percolation, same as the preceding.

Orange Bitters Extract. Fresh orange peel, chopped fine, 2 pounds; bitter orange peel, coarsely ground, 1 pound; oil of orange 1 fl.ounce, cologne spirit 6 pints, water sufficient to make 1 gallon. Mix the orange peels, fresh and dry, and cover them with cologne spirit 4 pints; let stand for a few days and pour off the liquid, pour on 2 pints fresh cologne spirit, macerate as before and pour off, then pour 3 pints of water on the drugs, macerate as before, pour off and express. Dissolve the oil of orange in the spiritous tincture and add the last portion obtained by maceration and pressure to it. After standing a few days, filter.

To make **Orange Bitters** for bottling, add 8 fl.ounces of this extract to 6 pints pure proof spirit, 2 pints water and 1 ounce of glycerin.

Peruvian Bitters Extract. Peruvian or calisaya bark, in coarse powder, 1½ pounds; bitter orange peel, coarse powder, 1 pound; galangal root, in fine powder, 1 ounce; cinnamon bark 2 ounces, nutmeg 1 ounce, cloves 1 ounce, alcohol 6 pints, water sufficient to make 1 gallon. Make by water-bath percolation, the same as angostura bitters.

To make **Peruvian Bitters** or **Cinchona Bitters** for bottling, mix 8 fl.ounces of this extract with 6 pints of pure proof spirit and 2 pints of water, and add 1 ounce of glycerin.

Stomach Bitters Extract. Wahoo bark 2 pounds, bitter orange peel 1 pound, hops 8 ounces, juniper berries 4 ounces, cardamom seed 4 ounces, cinnamon 3 ounces, cloves 1 ounce, nutmeg 1 ounce, alcohol 6 pints, water 2 pints. Grind the wahoo, orange and hops to a coarse powder, and the other drugs to a fine powder, mix them and make by water-bath percolation as directed for angostura bitters.

To make **Stomach Bitters** for bottling, mix 4 ounces of this extract with 6 pints of pure proof spirit and 2 pints of water, and add 1 ounce of glycerin.

Stoughton Bitters Extract. Gentian, in coarse powder, 1 pound; Virginia snake root, in coarse powder, 8 ounces; bitter orange peel, in coarse powder, 1 pound; sweet flag (calamus), in coarse powder, 8 ounces; cardamom seed, in fine powder, 4 ounces; cloves, in fine powder, 1 ounce; coriander seed, in fine powder, 2 ounces; red saunders, in fine powder, 4 ounces; alcohol 6 pints, water sufficient to make 1 gallon. Make by water-bath percolation as directed for angostura bitters. This is a strong extract and is to be diluted for use.

Wild Cherry Bitters Extract. Fluidextract of wild cherry 15 fl.ounces; oil of cherry laurel 60 minims, cologne spirit 1 fl.ounce. Dissolve the oils in the cologne spirit and mix with the extract.

Wild Cherry Bitters may be made by mixing 6 ounces of this extract with 6 pints of pure proof spirit and 1 ounce of glycerin.

COCKTAILS.

A variety of bottled cocktails are put up by manufacturers and have a considerable sale. They are generally composed of some spiritous liquor or liquors mixed with bitters and aromatics and sweetened. A few formulas are given here.

Fruit Cocktails. Whisky $\frac{1}{2}$ gallon, New England rum 1 pint, vermouth 1 pint, concentrated fruit syrup of any kind of fruit, 1 pint; water 1 pint, orange bitters extract 2 ounces, fruit acid 1 ounce. Mix them, and after standing, filter clear.

Gin Cocktail. Gin 5 pints, white wine 1 pint, concentrated pineapple syrup 1 pint, aromatic bitters extract (made without cochineal) 2 ounces, fruit acid 1 ounce. Mix them, and after standing, filter.

Martina Cocktail. Morning cocktail. Whisky $\frac{1}{2}$ gallon, vermouth 1 pint, absinthe 1 pint, syrup 1 pint, water 1 pint, stoughton bitters $\frac{1}{2}$ ounce, essence of lemon $\frac{1}{4}$ ounce, fruit acid 1 ounce. Mix them, and after standing, filter clear.

Rum Cocktail. Old New England rum 5 pints, vermouth $1\frac{1}{2}$ pints, syrup $\frac{1}{2}$ pint, water 1 pint, angostura or stoughton bitters $\frac{1}{2}$ ounce, fruit acid 1 ounce. Mix them, and after standing, filter clear.

Whisky Cocktail. Whisky 5 pints, vermouth $1\frac{1}{2}$ pints, syrup 1 pint, water $\frac{1}{2}$ pint, aromatic bitters extract 2 ounces, lemon extract $\frac{1}{4}$ ounce, fruit acid $\frac{1}{2}$ ounce. Mix them and, after standing, filter clear.

Wine Cocktails. These may be made with either white or red wine. They are quite similar to vermouth. White or red wine $6\frac{1}{2}$ pints, syrup $1\frac{1}{2}$ pints, aromatic bitters extract 2 ounces. Mix them, and after standing, filter clear.

CORDIALS, ETC.

A great variety of cordials, sweetened and flavored liquors, ratfias, bitters etc., are known to the trade, some of them having a considerable sale. A number of formulas for bitters and cordials have been given in other departments of this work, but a few of them will be noticed here.

Absinthe. The best absinthe is prepared by distillation, the genuine being made chiefly in the canton of Neufchatel in Switzerland. Extrait d'absinthe, as it is known in France, is prepared by pounding the leaves and flowers of various species of wormwood with angelica root, sweet flag root, the leaves of dittany of Crete (*Origanum dictamnus*), star anise fruit and other aromatics and macerating them in alcohol. After macerating for about 8 days, with frequent stirring, the compound is distilled, yielding an emerald colored liquor to which a small portion of oil of anise is usually added. Dioscorides, in the 1st century, mentions wine of wormwood, and the Monks of the middle ages were in the habit of adding sprigs of wormwood to their

wine. The introduction of absinthe into France seems to have been during the Algerian war, 1844-47. The soldiers were advised to mix absinthe with their wines as a febrifuge, and thus the habit of absinthe drinking became universal.

The absinthe thus described is the real Swiss absinthe, a strong alcoholic liquor; but a large amount of common absinthe made by mixing essential oils with spirits is used, although much inferior to the distilled Swiss product. A good article may be made as follows: Wormwood (fluidextract) 2 ounces, wormwood oil $\frac{1}{2}$ ounce, angelica oil $\frac{1}{2}$ drachm, calamus oil $\frac{1}{2}$ drachm, star anise oil $\frac{1}{4}$ ounce, fennel oil $\frac{1}{4}$ ounce, thyme oil, pure, 15 minims; coriander oil 10 minims, cologne spirit 5 gallons, water 5 gallons, sugar 5 pounds, coloring, sufficient. Dissolve the sugar in the water and the oils in the cologne spirit, mix the solutions and add the fluidextract of wormwood and enough green coloring to produce the desired color, or macerate 1 pound of fresh wormwood tops in the liquor for a few days until the desired color is obtained, and filter.

Ordinary Absinthe may be made with wormwood oil 30 minims; anise oil 15 minims, fennel oil 15 minims, coriander oil 2 minims, cologne spirit 5 pints, water 5 pints, sugar $\frac{1}{2}$ pound, wormwood fluidextract $\frac{1}{2}$ ounce, coloring, sufficient. Mix as above.

Anisette Essence. Many formulas, all differing somewhat in flavor, are employed for making anisette. The following combination will be found to be as agreeable as any: Oil of aniseed 8 fl.ounces, oil of coriander 1 fl.drachm, oil of cinnamon 1 fl.drachm, oil of nutmeg 30 minims, oil of neroli 30 minims, cologne spirit 8 fl.ounces. Mix them.

Anisette or Anisette Cordial. To make anisette mix 2 fl.ounces of the above essence with 4 gallons of cologne spirit and add to the mixture 5 gallons of water and 15 pounds of white sugar. Let stand and filter through a little magnesium carbonate if necessary.

Benedictine. This liqueur was invented by the Benedictine Monks in 1510 A. D., being first compounded under the presidency of Antonio II., Abbe of Fecamp, by a Florentine monk, Don Bernard Vencelli. Its renown was wide spread both as an aromatic liqueur and a digestive. During the French Revolution the Abbe was destroyed, but in 1863 M. Legrand obtained some of the archives of the ancient monastery, and among them claims to have discovered the formula for the liqueur which he soon began distilling, and now it may be had everywhere throughout the civilized world.

A very good imitation of Benedictine may be made as follows: Cloves, nutmegs, each, 2 grammes; cinnamon 3 grammes, lemon balm, peppermint, fresh angelica roots, genepi flowers (Swiss), each, 6 grammes; sweet flag root 15 grammes, cardamom, small, 50 grammes; arnica flowers 8 grammes. Cut and bruise the substances and macerate for 2 days in 4 liters of alcohol (85%), then add 3 liters of

water and distil 4 liters, to which a syrup prepared with 4 kilos of sugar dissolved in 2 liters of water, and enough water to make the volume up to 10 liters.

Chartreuse. This liqueur was originated about 1830 and is made at the principal monastery of the Carthusian Order in the rugged mountains near Grenoble in France. At Tourvoisie at the entrance to the desert of the Grand Chartreuse, about 5 miles from the monastery, the monks distil three kinds of liqueurs, the elixir, the yellow and the green Chartreuse; the last named being generally preferred. The following formula makes a very good imitation:

Green Chartreuse. Chinese cinnamon 1.5 grammes, mace 1.5 grammes, lemon balm 50 grammes, hyssop (flowering tops) 25 grammes, peppermint 25 grammes, thyme 3 grammes, costmary 12.5 grammes, genepi flowers 1 gramme, poplar balsam buds 1.5 grammes, angelica seeds 12.5 grammes, angelica roots 6.5 grammes, alcohol (85%), 6¼ liters, sugar 2½ kilos. Cut and crush the aromatic substances, macerate them for 24 hours in the alcohol, then add water and distil off 6 liters, add in the still 4 liters more of water and distil as long as the distillate shows spirit, mix the distillates, add the sugar dissolved in 1½ liters of water and finally enough water to make the measure 10 liters; color and filter.

Costmary is a species of tansy grown in southern Europe. Ordinary tansy may be used.

The yellow and white Chartreuse are much the same except in color. A very fair Chartreuse may be prepared from the essences. Essence of lemon balm 0.2 grammes, essence of hyssop 0.2 grammes, essence of angelica 1 gramme, essence of peppermint 2 grammes, essence of cinnamon 0.2 gramme, essence of nutmeg 0.2 gramme, essence of cloves 0.2 gramme, alcohol (85%), 4 liters; sugar 5 kilos, water a sufficient quantity to make 10 liters. Add the essence to the alcohol and, having dissolved the sugar in 3 liters of water, mix them and add enough water to make the measure 10 liters. Color green or yellow, or leave without coloring, and filter with magnesium carbonate in the filter.

Crème de Menthe. This is best prepared from peppermint and other ingredients by distillation by the following formula: Peppermint 600 grammes, balm 40 grammes, sage 10 grammes, cinnamon 20 grammes, orris root 10 grammes, ginger 15 grammes, alcohol (80%) 5½ liters, sugar 2¼ kilos, water sufficient to make 10 liters. Cut and bruise the drugs and macerate them for 48 hours in the alcohol, then add 3 liters of water and distil 5 liters, add to the still 3 liters of water and distil 5 liters; add to the still 3 liters more of water and distil as long as spirit comes over. Mix the distillates, and add a syrup prepared with the sugar and 1½ liters of water and add enough water to make the measure 10 liters, color green, and after standing, filter.

The proper green color of this liqueur is one of its attractions. Coloring solutions are furnished by manufacturers especially for this and other liqueurs.

A very good *crème de menthe* may be prepared from the essences, instead of by distillation, by the following formula: Essence of peppermint 240 grammes, essence lemon balm 0.2 gramme, essence sage 0.2 gramme, essence cinnamon 0.2 gramme, extract orris root 15 grammes, essence Jamaica ginger 15 grammes, alcohol 4 liters, sugar 5 kilos, water sufficient to make 10 liters. Add the essences and extract to the alcohol, then, having dissolved the sugar in 3 liters of water, mix, make up the measure with water to 10 liters and, after standing, filter; adding a little magnesium carbonate to the filter, and color.

Curaçoa. The sweet preparation which is most used is best made by distillation as follows: The skins of 18 or 20 oranges are grated or run through a meat cutter to break the oil cells, and mixed with Ceylon cinnamon 4 grammes, mace 2 grammes, and alcohol (85%) 5 liters; allowing to macerate, with frequent agitation, for two weeks. Water 3 liters is then added and the mixture distilled until no more spirit comes over. A syrup made with sugar $1\frac{3}{4}$ kilos dissolved in water 1 liter is then added and enough water to make the measure 10 liters and, after standing, filter clear.

This may also be prepared by dissolving fresh oil of orange $\frac{1}{2}$ ounce, oil of cinnamon 15 minims, oil of mace or nutmeg 8 minims, in 1 gallon of alcohol, adding sugar $1\frac{1}{2}$ pounds, dissolved in water 1 pint, and enough water to make the measure $2\frac{1}{2}$ gallons, and, after standing, filtering, adding a little magnesium carbonate in the filter to make clear.

Bitter Curaçoa is made by distillation as described for Chartreuse, from anise seed, juniper berries, orange peel, sage, large absinthe, sweet flag, each, 40 grammes; cloves, peppermint, lavender flowers, angelica root, each 20 grammes; macerated in $5\frac{1}{2}$ liters of alcohol (80%), for 48 hours, then adding water 3 liters, distilling off 5 liters, adding sugar $1\frac{3}{4}$ kilos, made into a syrup with water, and enough water to make 10 liters; color with caramel and filter.

Kümmel. This may be prepared by distillation from caraway seeds 450 grammes, anise seed 40 grammes, calamus 20 grammes, coriander 20 grammes, cinnamon 20 grammes, with alcohol (80%) 5 liters; adding sugar $2\frac{1}{2}$ kilos and water sufficient to make 10 liters.

This may also be prepared as follows: First make an **Essence of Kümmel**: Oil of caraway seed 2 ounces, oil of anise 30 minims, oil of calamus, oil of coriander, oil of bitter almond, each, 5 minims; cologne spirit 2 fl.ounces. Mix them. To prepare the kümmel, mix 2 ounces of this essence with 4 gallons of cologne spirit, add 5 gallons of water in which 15 pounds of granulated sugar has been dissolved, and, after standing, filter through a little magnesium carbonate.

Maraschino. This liqueur is prepared in Italy and Dalmatia from a variety of cherry. The fruits and seeds are crushed together, honey 1 part to 100 of the pulp added, and the whole fermented, then distilled and rectified. Sugar and water are then added and after storing for some time it is drawn off and bottled.

A very good imitation of this liqueur may be made with wild cherries, ripe, 90 kilos; raspberries 12 kilos, cherry leaves 5 kilos. Crush the fruit, allow to ferment, then add 750 grammes of peach nuts and 500 grammes of orris; distil and add syrup $2\frac{1}{2}$ liters, alcohol 3 liters and water to make 10 liters.

Noyeau and Kirsch are preparations of quite similar flavor prepared from the pits of cherries or other fruits having a bitter almond flavor, with pulp of fruits, spirits and sugar. Similar preparations may be made with a solution of essential oil of bitter almonds with some fruit juice, as cherry or peach, with cologne spirit and syrup added.

Roman Punch Essence or Extract. Oil of orange peel 3 fl.drachms, oil of lemon peel 3 fl.drachms, acetic ether 1 fl.drachm, amyl butyrate 2 fl.drachms, butyric ether 1 fl.drachm, oil of bitter almond 10 minims, glycerin 2 fl.ounces, fresh orange juice 2 fl.ounces, cologne spirit 12 fl.ounces. Mix them and, after standing, filter.

Roman Punch, for bottling. Jamaica rum 1 quart, brandy 1 quart, sugar 2 pounds, fruit acid $\frac{1}{2}$ ounce, Roman punch essence 1 ounce, water sufficient to make 1 gallon.

Vermouth. A number of aromatic wines of this name are found upon the market, having similar, but distinguishing characteristics. They are mostly Italian productions. The following formula will produce a satisfactory preparation: Large absinthe 125 grammes, gentian 60 grammes, angelica root 60 grammes, blessed thistle 125 grammes, lesser centaury 125 grammes, lesser germander 125 grammes, Chinese cinnamon 100 grammes, nutmeg 15 grammes, sliced fresh oranges 6 grammes, sweet wine 95 liters, alcohol 5 liters. Mix and macerate for one or two weeks, with frequent agitation, draw off and filter, then bottle.

The foregoing represent only a small part of the cordials, liqueurs etc., known to the trade, but they are those most in demand, and others may be made from fruits and flavors in the same general way.

PART VII.

MISCELLANEOUS

The formulæ which follow for miscellaneous preparations, often required in the druggist's business, are, so far as possible, arranged in classes according to their uses. Only a limited number of such formulas can be given in the space which is devoted to this subject, and we have endeavored to select such as are best suited for the purpose.

ADHESIVE PREPARATIONS.

Cements.

These are generally to be applied to the edges of the articles to be mended, previously warmed, and they are then to be held or bound together with twine or otherwise until the cement hardens. The cements have to be warmed also.

Diamond Cement. Gelatin 1 ounce, water 5 ounces, gum mastic $1\frac{1}{2}$ drachms, gum ammoniac $\frac{1}{2}$ drachm, alcohol $2\frac{1}{2}$ ounces. Dissolve the gelatin in the water and continue the heat until the solution has evaporated to about 3 fl.ounces; have the gums previously dissolved in the alcohol, and to this solution, heated nearly to boiling, add the hot solution of gelatin and mix them thoroughly. Put up in small bottles, tightly stopped.

This cement may be used for china or glass ware, and for attaching wood, ivory, jewels, metallic substances etc.

Glutina Cement. For glass, china, wood, leather etc. Gelatin (Cooper's or Cox's) 3 ounces, acetic acid 2 ounces, carbolic acid 5 grains, oil of cloves 5 minims, water enough to make 1 pint. Soak the gelatin in half a pint of water for 4 hours, then heat by water-bath in a glass or porcelain vessel, add the acids, dissolve, add the oil of cloves and sufficient hot water to make a pint. Strain.

Insoluble or Chrome Cement. For glass and china. This cement, which is impervious to hot water, should be freshly made when wanted for use. Gelatin, in small pieces, 1 drachm; hot water $\frac{1}{2}$ ounce, potassium bichromate 15 grains. Dissolve the gelatin in the water contained in a small bottle, by means of a water-bath, and, while hot, add the potassium bichromate and apply as soon as possible, binding the pieces firmly together, and setting in the sunlight. The gelatin and chrome salt form an insoluble compound.

Transparent Cement. For china, glass etc. Mix in a well-stopped bottle 20 parts of chloroform and 25 parts of native India rubber, or caoutchouc, cut in small pieces; when dissolved add 5 parts of mastic and let the whole macerate for 8 or 10 days, shaking daily, then strain quickly through very thin cotton cloth. This makes a very firm, transparent cement for china and glass, and may be used for other purposes.

India Rubber Cement or Glue. For rubber etc. Dissolve gutta percha chips or sheets in carbon disulphide until the solution has assumed the consistence of thick syrup, and strain the mixture with pressure, quickly through a thin cotton cloth. To use this on rubber shave down the edges to be cemented thin, apply the cement freely and warm the parts for a moment, join together and press, clamp or hammer down to hold them firmly until dry.

Aquarium Cement. Water lime or Portland cement, marble dust or white sand, litharge, each, 4 ounces; powdered resin $\frac{1}{2}$ ounce. Mix the powders and make into a putty with boiled linseed oil just before using.

Cement for Lamps. Plaster of Paris wet up with glue water is generally used, but a more permanent cement may be made by dissolving 1 ounce of concentrated lye in 5 ounces of water, adding 3 ounces of powdered resin, and boiling them together 5 to 10 minutes. Then to make the cement, just before using mix plaster of Paris up with this solution to the proper consistence and apply.

Amber Cement. To cement or join amber, paint the edges to be united with boiled linseed oil, press firmly together and warm for some time at a degree of heat not high enough to melt the amber.

To Join Glass to Metal. To cement glass, porcelain, earthenware or other hard substances to metal, melt a little shellac and join the substances with it while it is melted.

Metal Cement. An excellent cement for metallic substances may be made by dissolving shellac to saturation in water glass, by the aid of heat.

Rubber Tire Cement. A cement for rubber tire bicycles and other similar uses may be made by dissolving india rubber 1 part in sufficient naphtha, by the aid of gentle heat of a water-bath, and when melted adding 2 parts of shellac, and melting them together, by water-bath,

the naphtha is evaporated. Pour the melted mass on metal plates or run into sticks. When used the parts are to be well warmed and the cement heated and applied like sealing wax.

Another formula is: Gum chicle 4 ounces, carbon bisulphide 6 ounces. Put the gum in a wide-mouthed bottle, add the liquid and stop tightly, set in a warm place and agitate freely for several days, then, when the gum is all dissolved, strain through thin cloth or fine wire strainer.

Porcelain Cement. White lead 2 ounces, pipe clay $1\frac{1}{4}$ ounces, boiled linseed oil 1 ounce. Heat together on a water-bath until well incorporated. Paint the edges of the porcelain with the cement, join them firmly together and dry slowly in a warm place.

Universal Cement. Sugar 4 ounces, water 12 ounces, slaked lime 1 ounce. Dissolve the sugar in the water in a closed flask and add the lime. Keep the mixture at a temperature of about 70° to 75°C. for 3 days, shaking occasionally. Then cool and pour off the clear liquid. Take of this liquid $6\frac{1}{2}$ ounces, water $6\frac{1}{2}$ ounces, gelatin 16 ounces, glacial acetic acid $1\frac{1}{2}$ ounces, oil of lavender 15 minims. Mix the liquid with the water and soak the gelatin in the mixture for 3 hours, then heat to dissolve and when cool add the acetic acid and oil, shaking them well together.

Liquid Cement. Take 4 ounces of the above saccharated solution of lime and dissolve in it 6 ounces of glue by heat, add 145 grains oxalic acid to neutralize the lime, and after standing a few hours, strain to remove precipitate.

Glues.

Glues are prepared from glue, gelatin etc., and are used for joining substances like wood, ivory, leather etc. together, and for many other purposes. Some are prepared in solid form, requiring to be melted before using, and others are made to remain liquid by the addition of various substances. See also articles on Gelatin, Liquid Glue and Tungstic Glue.

Glue, Ordinary. This is prepared by melting glue in water by the means of a glue pot or water-bath. It is made of different consistence for various purposes, more or less water being used as required. It must be applied hot and the surfaces to be joined well bound together until dry.

Liquid Glue. Glue may be first made liquid by melting in water as above, and then adding alcohol 1 ounce to about 3 ounces of glue, used while still liquid, but most liquid glue is prepared with acid, either acetic or nitric. It may be made any desired consistence by using more or less glue. A little oil of sassafras or cloves is generally added to prevent molding.

A good liquid glue for bottling may be made with good glue 1 pound, dissolved by means of a water-bath in water 1 pint, in a por-

celain vessel, and when dissolved, gradually adding 5 ounces of nitric acid, with constant stirring; or good glue $5\frac{1}{2}$ ounces, acetic acid $5\frac{1}{2}$ ounces, oil of sassafras 15 drops, water enough to make 1 pint, made in the same manner.

An excellent liquid glue may be made with ground glue 8 ounces, water 16 ounces, borax $1\frac{1}{2}$ ounces, oil sassafras 1 drachm, alcohol $\frac{1}{2}$ ounce. Dissolve the borax in the water and add the glue, after 1 hour dissolve by the aid of heat in a glue pot, or by water-bath, strain while hot; when nearly cool add the oil of sassafras previously dissolved in the alcohol. This glue will remain liquid in summer and has only to be warmed slightly in winter.

Another formula for liquid glue is: Slaked lime $1\frac{1}{2}$ ounces, sugar 6 ounces, water 18 ounces, glue 6 ounces, oil sassafras 1 drachm. Dissolve the lime and sugar in hot water and add the glue, allow to swell, then heat until the glue is dissolved, strain and while cooling add the sassafras oil.

French Liquid Glue. Glue 8 ounces, nitric acid $2\frac{1}{2}$ ounces, water 8 ounces. Add the water to the glue and, after standing a few hours heat until dissolved. To the solution add the nitric acid, gradually and in portions, stirring all the time. Effervescence will ensue with evolution of nitrous acid fumes. When all the acid has been added strain the liquid and allow to cool. Keep in well-stoppered bottles.

Another formula is: Gelatin 16 ounces, glue 16 ounces, acetic acid (20%) 32 ounces, alum 150 grains, alcohol 5 fl.ounces. Soak the gelatin and the glue in the acetic acid for 6 hours, then add the other ingredients and heat together for 6 hours.

Water-Proof Glue. Marine Glue. This is prepared by dissolving separately in a sufficient quantity of pure ether 3 parts of shellac and 1 part of India rubber and, when dissolved, mixing the solutions and keeping in tightly-stoppered bottles. This is insoluble either in hot or cold water, acids etc.

Another kind of glue that will resist moisture etc. may be made by adding a solution of sandarach, mastic and turpentine gum, each, 1 part, in alcohol 16 parts, to ordinary glue or gelatin melted in water. The quantity to be used depends upon the use for which it is required, about 1 ounce to 2 ounces of glue in a pint being the proportion for ordinary purposes.

Elastic or Mouth Glue. This is prepared by dissolving good glue in an equal quantity of water, and adding to it one-half as much glycerin, and one-fourth as much sugar as was used of the glue. This is run into small pieces, and may be moistened and applied to paper or other light substances.

Pad Glue. This is now extensively used for the backs of pads of paper to fasten the leaves together, and for other similar purposes. Glue $\frac{1}{2}$ pound, water $\frac{1}{2}$ pint, acetic acid 1 ounce, glycerin 2 ounces,

aniline red, green, blue or other color in solution, 1 fl.drachm, or sufficient to color. Make the glue in the usual manner by melting in the water in a glue pot or water-bath, and add the glycerin and coloring matter. This may be made more or less brittle or elastic by varying the quantity of glycerin.

Liquid Padding Glue. Either of the above formulas for liquid glue makes excellent padding glue. It may be colored red, blue, yellow or any color by adding a sufficient quantity of the desired aniline dye.

Mucilages.

Adhesive mucilages for sticking labels to bottles, tinware etc., papers together, and for gumming the backs of paper used for stamps, labels etc., are much used. The following are the various kinds employed for various purposes.

Casein Mucilage. Heat sour milk with a little tartaric acid, which causes the casein to separate. Collect and press the mass and while still warm add enough of a solution of borax 1 ounce in 1 pint of water to nearly dissolve the casein. This may be used for the back of label paper and other adhesive purposes.

Label Mucilage. Soak 6 ounces of glue in 20 ounces of warm water, and then dissolve by heat; while warm dissolve in it 3 ounces of granulated gum arabic and 8 ounces of rock candy. This is for gumming the backs of sheets, for labels etc., and must be applied, while warm, with a brush.

Stamp Mucilage. The following is said to be the same as is used for gumming U. S. stamps: Dextrine 2 ounces, gum arabic 1 ounce, acetic acid $\frac{1}{2}$ ounce, sugar 1 ounce, oil of sassafras 10 drops, water 6 ounces. Mix and dissolve by heat of a water-bath, and apply with a brush while warm.

Good Cheap Mucilage. This may be made by soaking 1 part white glue or gelatin and 2 parts of gum arabic in 10 parts of water, adding $\frac{1}{4}$ part of sugar, dissolving by gentle heat, straining and adding a few drops of oil of cloves to keep.

Dextrin Mucilage. Dextrin 3 parts. water 5 parts, dissolve by heat of a water-bath.

Mucilage for Tin and Metal. Most mucilages will not stick on tin or bright surfaced metals, and a mucilage must be specially prepared for this purpose. The following is A 1: Starch 1 pound, water $\frac{1}{2}$ pint, tin muriate solution 4 fl.ounces, glycerin 1 ounce, oil of sassafras 30 drops. Mix the tin muriate solution with the water and glycerin, and add to the starch, boil them together until a clear mucilage is formed, and while cooling add the oil of sassafras.

The surface of the tin where the label is to stick should be rubbed over with a cloth moistened with gasoline.

Mucilage of acacia and mucilage of tragacanth, which are much used for adhesive purposes are noticed elsewhere in this book.

Pastes.

Pastes for adhesive purposes are made from flour or starch, and are much cheaper than most mucilages for pasting labels, wrappers etc. When druggists are once accustomed to their use they prefer them to mucilage for that purpose, as they dry quicker, keep in place better, and do not wet the paper like mucilage. The following formulas will be sufficient:

Good Flour Paste. Wheat flour 4 ounces, alum, in powder, 90 grains; oil of cloves 5 minims, carbolic acid 10 grains, water 1 pint. Mix the flour with enough water to make a thin mixture, heat the remainder of the water to boiling, add the alum to it and then add it quickly to the mixture of flour and water, stirring them well together and heating if necessary to make a good smooth paste, while cooling adding the oil of cloves and acid.

Good Starch Paste. This may be made in the same manner as the foregoing, only using starch in place of flour; 1 ounce of glycerin added is advantageous.

Paste for Tin. To either of the foregoing formulas add 1 ounce of glycerin, $\frac{1}{4}$ ounce of lead acetate, in powder, and $\frac{1}{4}$ ounce solution tin muriate, to the boiling water, which is added to the flour or starch.

Another formula is: Brown sugar 1 pound, gelatin 1 drachm, alum 1 drachm, corn starch 3 ounces, water 16 ounces. Dissolve the alum in 8 ounces of water and add the glycerin; after soaking a few minutes heat to boiling and add the sugar, continuing the heat until it is dissolved. Beat the corn starch up to a smooth paste with 8 ounces of water and add to the mixture the hot solution of sugar etc., continue the heat with constant stirring until a smooth translucent paste is produced.

This paste adheres firmly to tin, but as there is always a little grease on tin it should be rubbed over with a rag moistened with solution of soda, or better yet, with solution antimony chloride, which slightly roughens the surface of the tin.

Library Paste. White dextrin 8 ounces, lead acetate 2 drachms, water 16 ounces, nitrobenzol 20 minims. Warm the water nearly to boiling and dissolve it in the lead acetate; then add the dextrin and the nitrobenzol, beating them well together until a smooth uniform paste is produced. Other flavoring than nitrobenzol may be used. Insects will not attack this paste.

Dextrin Mucilage. Dextrin, yellow or white, 4 ounces; water 6 ounces, alum 45 grains, glucose (or syrup) 90 grains. Mix the glucose with the water and dissolve the alum in the liquid; then add the dextrin. Stir well together and heat to about 195°F. until it is converted into a smooth, uniform mucilage.

Anatomical Paste. For Specimens, etc. White dextrin 8 ounces, corrosive sublimate 20 grains, water 12 ounces, nitrobenzol 20 minims.

Dissolve the corrosive sublimate in the water warmed nearly to boiling and stir in the dextrin and the nitrobenzol, beating them well together to make a smooth, uniform paste.

BAKING POWDER.

In making baking powders it is necessary in the first place to choose good and appropriate materials, and in the second place to have the articles which enter into the composition dry and very finely powdered. They must then be combined in such proportions that the acid will exactly unite with the alkaline base, setting free the carbonic acid gas which is united with it, which causes, by its escape through the dough, the lightness of pastry.

In choosing materials to combine in baking powders it is necessary to select such substances as will not react upon each other when mixed dry, but which will combine to liberate the carbonic acid gas under the influence of moisture and heat. Cream of tartar, because of its insolubility, is the most serviceable of the acids for this purpose, and sodium bicarbonate, which contains a large quantity of carbonic acid gas, readily liberated when acted upon by an acid, is the best of the alkaline bases.

Owing to the uncertain composition and strength of the materials used for making baking powder, it is difficult to give definite formulas that work every time to the entire satisfaction of the operator, for the test of the powder in baking is the only general way by which it may be known if the articles used are balanced so as to be neither acid nor alkaline.

It is also very important that the material used be very finely powdered, thoroughly dry and perfectly mixed. Baking powders cannot be thoroughly mixed by hand or in a mortar, because small particles of the sodium bicarbonate will adhere together and when used will make yellow spots or points in the pastry; some kind of a mixer is therefore required that will thoroughly crush these particles and mix all together intimately. Several kinds of mills and mixers are furnished for this purpose. The following formulas will, if properly combined from good material, make excellent baking powders, but it should be understood, as previously explained, that the operator should test the powder by baking before sending it out, and if it needs more acid or more alkali, add it until it is properly proportioned to make the best.

Baking Powder No. 1. Pure cream tartar 3 pounds, pure sodium bicarbonate $22\frac{1}{2}$ ounces, best roller flour 1 pound, corn starch $\frac{1}{2}$ pound. If preferred $\frac{1}{2}$ pound corn starch and $\frac{1}{2}$ pound flour may be used in place of 1 pound flour, in which case the starch must be finely powdered. Use $1\frac{1}{2}$ teaspoonfuls to 1 quart of flour. This is the best formula.

Baking Powder No. 2. Pure cream tartar $1\frac{1}{2}$ pounds, pure sodium bicarbonate 13 ounces, tartaric acid 1 ounce, best roller flour 1 pound, corn starch $\frac{1}{2}$ pound. Use 2 teaspoonfuls to 1 quart flour.

Baking powder No. 3. Pure cream tartar 2 pounds, pure sodium bicarbonate 1 pound, roller flour $1\frac{1}{2}$ pounds, tartaric acid 1 ounce, corn starch $1\frac{1}{2}$ pounds. Use 2 teaspoonfuls to 1 quart flour.

Baking Powder No. 4. Pure cream tartar 1 pound, pure sodium bicarbonate 1 pound, tartaric acid 3 ounces, roller flour 2 pounds, corn starch $\frac{1}{2}$ pound. Use 2 teaspoonfuls to 1 quart flour. This is a good cheap powder. Keep well covered.

The following formulas for baking powders were published by Geo. F. Payne, of Atlanta, Ga., in *The Formulary*, February, 1895:

Cream of Tartar Baking Powder. Cream of tartar 2 pounds, sodium bicarbonate 1 pound, starch, powdered, $\frac{3}{4}$ pound.

Tartaric Acid Baking Powder. Tartaric acid 1 pound, sodium bicarbonate 1 pound, starch, powdered, $\frac{1}{2}$ pound.

Acid Phosphate Baking Powder. Acid calcium phosphate $1\frac{1}{2}$ pounds, sodium bicarbonate 1 pound, starch, powdered, $1\frac{1}{4}$ pounds.

Phosphate and Alum Baking Powder. Acid calcium phosphate 2 pounds, dried ammonia alum 2 pounds, sodium bicarbonate 2 pounds, starch, powdered, 5 pounds.

Alum Baking Powder. Dried ammonia alum 1 pound, sodium bicarbonate 1 pound, starch, powdered, 1 pound.

The ingredients, all finely powdered, should first be sifted separately to get rid of hard lumps, then the soda and starch should be well mixed together, and finally the acid ingredients should be added and all thoroughly incorporated, either by rubbing together in a mortar, or by sifting at least three times. Flour can be used in place of starch and is considerably cheaper. The amount of starch may be increased in any of the recipes. Each receipt will produce a baking powder equal to the very best of its respective kind, if the best chemicals are used. Adulteration is so common in cream tartar that this chemical should always be carefully tested when purchased.

CLOTH CLEANING COMPOUNDS.

For cleaning cloth, gloves, lace and delicate fabrics that cannot well be washed in the ordinary way, many preparations are put up and sold. Most of them are simply gasoline or deodorized benzine, perfumed with some fragrant oil, but other compounds are also used. Washing compounds are also included under this heading. The following are representative of the various preparations:

Benzin Jelly. White soap 12 ounces, hot water 18 ounces, ammonia water 3 ounces. Dissolve the soap in the hot water, pour in a bottle and add the ammonia water. Then add to the mixture 2 pints

of gasoline or deodorized benzine and shake thoroughly until the mixture is cold and solidified. This is applied by rubbing on the grease spots, and afterwards washing out with warm water.

Cleaning Cream. Ivory, or other white soap 8 ounces, sal tartar $\frac{1}{2}$ ounce, borax 2 ounces, oil of sassafras 2 drachms, water $1\frac{1}{2}$ pints. Cut the soap in small pieces and dissolve in the water by the heat of a water-bath, add the borax and sal tartar and, while cooling add the oil of sassafras, mixing them well together. This removes grease, paint and dirt by rubbing in and washing out with warm water.

Cloth and Glove Cleaner. Gasoline or deodorized benzine 1 quart, alcohol, chloroform, ether, each, $\frac{1}{2}$ fl.ounce. Mix them. This may be put up and sold at fancy prices for cleaning silks, gloves etc. It may be perfumed with lavender or cologne.

Clothes Cleaning Compound. For removing paint, grease, dirt etc. Ammonia water 1 pint, alcohol 9 fl.ounces, soap liniment 6 fl.ounces, borax, in powder, 4 ounces; Castile soap, cut or shaved, 4 ounces; boiling water 6 quarts. Dissolve the soap and borax in the boiling water and when cool add the other ingredients. This is to be applied by rubbing into the grease spot, and then washed out with clear warm water.

Erasive Soap. White soap 8 ounces, borax 1 ounce, sal tartar 1 drachm, oil of sassafras 1 drachm, water 8 ounces. Cut the soap in shavings and dissolve in the water by heat of a water-bath, add the borax and sal tartar and boil until reduced to 1 pound, then while cooling add the oil of sassafras and make into cakes of about 2 ounces.

Fragrant Benzine or Gasoline. Gasoline 1 gallon, oil of bergamot $\frac{1}{4}$ ounce. Mix them. Any other volatile oil, as oil of cloves, cassia, lavender, lemon etc., may be used instead of bergamot. This may be put up by any fancy name and recommended to clean cloth, silks, gloves etc., and remove grease spots.

Household Ammonia. (Clear). Potassium carbonate 1 ounce, rain water 4 pints, ammonia water, 16° , 4 pints. Dissolve the potassium carbonate (sal tartar) in the water and add the ammonia water.

Household Ammonia. (Cloudy). Ivory soap (or other good white soap) 4 ounces, rain water 4 pints, ammonia water, 16° , 4 pints. Shave the soap, dissolve in the water by aid of heat and when cool add the ammonia water.

Imperial Cloth and Glove Cleaner. For silk goods, fine fabrics, ribbons, gloves etc. Wood alcohol 1 gallon, ether 1 ounce, chloroform 1 ounce, oil of bergamot 1 drachm, essential oil of almonds 10 minims. Mix them. To be applied with a soft cloth or sponge.

Imperial Grease Remover. Acetone 1 fl.ounce, denatured alcohol 2 fl.ounces. Mix them. This will remove all manner of grease from any fabric and will not change the color. A cotton cloth should be moistened with the liquid and the grease spots well rubbed, and, while still moist rubbed with a dry cloth.

Peerless Clothes Cleaner. This compound is used by tailors for renovating and cleaning garments. Soap bark, ground, 4 ounces; borax, in powder, 4 ounces; Ivory soap (or other good white soap) 4 ounces, wood alcohol 1 pint, ammonia water, 16°, 1 pint; boiling water 6 pints. Shave the soap fine and dissolve it in the boiling water. Pour the solution at once upon the soap bark and borax, stir well and let it stand half a day, then strain or filter, adding enough water through the filter to make 6 pints, and add the ammonia water and wood alcohol.

Peerless Grease Extractor. Carbon tetrachloride 1 fl.ounce, denatured alcohol 2 fl.ounces. Mix them. This will remove all manner of grease from any fabric. A cotton cloth should be moistened with the liquid and the grease spot well rubbed, and, while still moist, rubbed with a dry cloth.

Peerless Washing Fluid. Soap bark, ground, 8 ounces; borax 4 ounces, concentrated lye or potash 1 pound, white (Ivory) soap 1 bar, oil of turpentine 2 ounces, ammonia water 1 pint, oil of sassafras $\frac{1}{2}$ ounce, boiling water 1 gallon. A tablespoonful of this may be used for each gallon of water in which the clothes are put to soak.

Washing Fluid. Concentrated lye or caustic soda 1 pound, oil of turpentine 2 ounces, borax 2 ounces, camphor $\frac{1}{2}$ ounce, soap bark, ground, $\frac{1}{4}$ pound; ammonia water $\frac{1}{2}$ pint, water sufficient. Steep the bark for 2 hours in $\frac{1}{2}$ gallon of water, strain and press. Dissolve the concentrated lye and borax in $\frac{1}{2}$ gallon of water and add to the decoction of soap bark. Dissolve the camphor in the oil of turpentine and add to the solution, then add the ammonia water and, after standing, pour off or strain, add a tablespoonful of this to each gallon of water used for soaking the clothes before washing, and a little in the washing water.

Washing Fluid. Sal soda 4 pounds, borax 2 ounces, sal tartar 1 ounce, ammonia water $\frac{1}{2}$ pint, camphor spirit 2 ounces, oil of turpentine 1 ounce, hot water 6 pints. Dissolve the salt in the hot water and add the liquids. This may be used the same as the foregoing.

Washing Crystal or Powder is prepared by mixing coarsely ground borax 8 ounces with potassium carbonate (sal tartar) 4 ounces, or crude potash 3 ounces. The "1776" and other similar compounds are made by adding excess of alkali to soap while making and evaporating to a mass or granular powder. It requires special machinery, and cannot be made except in large factories.

DISINFECTANTS.

The following are a few of the disinfectants which have been most popular. Many others may be found on the market, either as proprietary, or regular preparations of pharmacy.

Disinfecting Powders.

No. 1. Crude carbolic acid 5 pounds, iron sulphate $2\frac{1}{2}$ pounds, slaked lime 15 pounds, plaster Paris 75 pounds, Venetian red 10 pounds. Powder and mix thoroughly.

No. 2. Plaster Paris 15 pounds, quick lime, powdered, 10 pounds, magnesia 10 pounds, crude carbolic acid 15 pounds, whiting 7 pounds. Mix thoroughly.

No. 3. Quicklime, powdered, 70 pounds; charcoal, powdered, 10 pounds; crude carbolic acid 6 pounds, zinc chloride 10 pounds, chlorinated lime 5 pounds, whiting 5 pounds. Mix them thoroughly.

No. 4. Iron sulphate 10 pounds, plaster Paris 10 pounds, crude carbolic acid 8 pounds. Powder the iron and mix thoroughly with the other ingredients.

No. 5. Iron sulphate 3 pounds, slaked lime 3 pounds, road dust 4 pounds. Powder the iron sulphate and mix thoroughly with the other ingredients. This is a cheap and effective disinfectant for privy vaults.

No. 6. Crude carbolic acid 2 pounds, slaked lime 3 pounds, road dust 5 pounds. Mix them thoroughly.

Disinfecting Solutions.

To give formulas for all the disinfecting solutions which have been used would require a volume. We can, therefore, only mention those which have been best known and have most merit. The formulas for many of them are given under other headings, as Solution of Chlorinated Lime, Solution of Chlorinated Soda, Solution Zinc Chloride etc., nearly all having in them free or combined chlorine, which is considered the best available disinfectant.

Aminol. Slaked lime 30 grains, salt (sodium chloride) 60 grains, trimethylamine 5 grains, water 34 fl.ounces. Mix and dissolve. This is used as a disinfecting wash for wounds, sores and ulcers, and for application by wetting a linen cloth, also for injections.

Solution Bromo-Chloralum. Under the name Bromo-Chloralum, put up by Tilden & Co., a solution for disinfecting etc., is well known. A similar preparation may be made as follows: Alum 11 ounces av., sodium carbonate (sal soda) 10 ounces av., potassium bromide 8 ounces av., hydrochloric acid a sufficient quantity, water sufficient to make a gallon. Dissolve the alum in 6 pints of boiling water and add the sodium carbonate to the solution which precipitates aluminum hydrate; add to the mixture sufficient hydrochloric acid to dissolve the precipitate, then dissolve the potassium bromide in the solution and, if necessary, add sufficient water to make the measure 1 gallon.

Condy's Fluid or Solution. A solution of potassium permanganate, made by dissolving $\frac{1}{2}$ ounce potassium permanganate in 1 gallon of water. By using the crude salt a very cheap and efficient disinfectant

may be made. This solution is also a very valuable wash for foul ulcers and sores.

Coutaret's White Fluid or Solution. Zinc sulphate $1\frac{1}{3}$ ounces, water sufficient to make 1 pint.

Creolin Disinfectant. This is sold under various titles as a disinfectant for urinals and closets, being usually arranged with a drip apparatus. It is sometimes flavored with cheap aromatic oils. The formula for creolin will be found elsewhere in this work.

Darby's Prophylactic Fluid or Solution. Potassium permanganate 5 grains, potassium sulphate 150 grains, potassium carbonate $1\frac{3}{4}$ ounces av., potassium chloride $\frac{1}{4}$ ounce av., water sufficient to make 1 pint.

De Wessely's Disinfecting Solution. Iron sulphate 1 ounce av., iron chloride $3\frac{1}{8}$ ounces av., zinc chloride $1\frac{1}{8}$ ounces, water sufficient to make 1 pint.

Farwell's Disinfectant Solution. Iron sulphate $2\frac{1}{8}$ ounces av., carbolic acid 5 drachms, water sufficient to make 1 pint.

Girardin Disinfectant Solution. Zinc sulphate $4\frac{1}{8}$ ounces, copper sulphate $\frac{1}{4}$ ounce, lime sulphate $\frac{1}{3}$ ounce, water sufficient to make 1 pint.

Granville Carbolic Alkali. Carbolic acid $\frac{3}{4}$ ounce, caustic potassa 150 grains, water sufficient to make 1 pint.

Le Doyen's Disinfectant Solution. Lead nitrate $2\frac{1}{8}$ ounces av., water sufficient to make 1 pint.

Mattenheimer's Disinfecting Fluid. Iron sulphate 1 ounce, carbolic acid 7 drachms, water sufficient to make 1 pint.

Monsell's Disinfecting Solution. Solution of iron subsulphate 8 fl.ounces, iron nitrate $2\frac{1}{2}$ ounces, water sufficient to make 1 pint.

Phenol Sodique. Carbolic acid $1\frac{1}{8}$ ounces, caustic soda sufficient to neutralize, (about $\frac{1}{2}$ ounce), water sufficient to make 1 pint. A cheaper phenol sodique may be made by using crude carbolic acid.

Seeley's Disinfecting Solution. Manganese sulphate $2\frac{1}{8}$ ounces av., iron sulphate 1 ounce av., sulphuric acid $1\frac{3}{8}$ ounces av., muriatic acid $\frac{1}{4}$ ounce av., water sufficient to make 1 pint.

Compound Solution of Zinc and Iron. Zinc sulphate 16 tr.ounces, iron sulphate 16 tr.ounces, naphthol 20 grains, oil of thyme 60 minims, hypophosphorous acid 120 minims, water enough to make 5 pints. Dissolve the zinc and iron sulphate in 5 pints of boiling water, add the naphthol and oil of thyme and shake the mixture occasionally in a stoppered bottle until it is cold. Then add the hypophosphorous acid, filter the liquid through a wetted filter and, lastly, pass enough water through the latter to make 5 pints.

Compound Solution of Zinc and Aluminum. Zinc sulphate 16 tr.ounces, aluminum sulphate 16 tr.ounces, naphthol 20 grains, oil of thyme 60 minims, water enough to make 5 pints. Dissolve the zinc

sulphate and aluminum sulphate in 5 pints of water, by the aid of heat, add the naphthol and oil of thyme, and shake the mixture occasionally in a stoppered bottle until it cools. Set it aside for a few days, then pass through a wetted filter, following it with enough water to make 5 pints.

The commercial aluminum sulphate (not alum) may be used for this preparation. This generally contains a trace of iron, but by allowing the liquid to stand, this will be generally precipitated.

EXTERMINATORS, DESTROYERS AND POISONS.

For exterminating or poisoning rats, mice, bugs, flies and vermin generally, a great many different kinds of preparations are put up and sold. The following represent some of the best for this purpose:

Bed Bug Poison or Exterminator. Corrosive sublimate, in powder, 2 ounces av., alcohol 1 pint. Dissolve the powder in the alcohol and apply to the bedsteads and crevices where the vermin hide.

Another poison for the same purpose may be made with potassium cyanide 2 ounces av., water 1 pint. Dissolve and apply. These may be used for any kind of bugs, ants or vermin to which they can be applied.

Bug and Ant Poison. As a poison for cockroaches, other bugs and ants to eat, the following will give satisfaction: Tartar emetic 1 ounce, powdered sugar 7 ounces. Mix them intimately together and place the powder where the vermin will find it: It is better to dissolve 1 ounce of this powder in half a pint of hot water and put in dishes where the ants etc. will find it.

Bug and Cockroach Destroyer. Carbon tetrachloride 1 pint, denatured alcohol 3 pints. Mix them. This is to be used with a sprayer by which it may be injected into all the haunts of the vermin. It is most effectual for any kind of bugs, cockroaches, moths, Buffalo bugs etc. that infest beds, carpets, furniture, closets or rooms. It is non-inflammable and will not injure the colors of fabrics, carpets, curtains etc.

Sticky Fly Paper. Common resin 1 pound, castor oil about 5 ounces. Melt the resin and add sufficient castor oil to make it sufficiently adhesive when applied to paper. As resins vary, a little less or more than 5 ounces may be needed. Prepare manilla paper or other firm paper by brushing over each sheet with a size made of glue $\frac{3}{4}$ pound, melted in hot water 1 gallon. This is applied hot, with a brush, to the paper, and the sheets dried by hanging them on lines. The resin compound is then applied warm, with a brush, to the sized sheets, which are then folded together.

Anti-moth Paper. Carbolic acid, camphor, oil of cedar, each, 1 part; benzin 8 parts. Dissolve and dip sheets of heavy porous paper in the liquid and hang on lines until the benzin evaporates. The paper should

then be cut up and kept in tin boxes. These sheets are put away in drawers or with furs etc. to prevent moths.

Rat Poison. A great variety of poison for rats and vermin are put up under various names and in various forms. They consist mainly of arsenic, with the addition of some coloring matter or other substances.

Rough on Rats is an example of a proprietary rat poison. It consists of arsenic colored a little with ivory black or some other black substance. It is mixed with lard and sugar and spread upon bread.

Rat Paste Poison. This may be made by mixing arsenic with brown sugar, equal parts, and making into an ointment or paste with lard, the same quantity as is taken of the arsenic.

Tartar emetic may be used instead of arsenic.

Luminous Paste for Rats, Roaches etc. This was formerly quite a favorite rat poison, as it shines in the night, attracting the attention of the rats, and at the same time acts as a poison. It is best made by melting phosphorus 1 ounce with petrolatum or lard 1 pound, by means of a water-bath, and while melted and well mixed by agitation in a closely stopped wide-mouth bottle, allow to cool and solidify. This may then be mixed with sugar 1 pound and flour 1 pound, or sufficient to make a stiff mass.

A better luminous paste is made with arsenic, luminous paint (made without turpentine) and sugar, each 1 part, well mixed.

Mosquito or Black Fly Preventive. Hunters or fishers who go into the woods during the summer are much annoyed by flies and mosquitoes. The following preparation is for rubbing on the hands and face to keep them off. Petrolatum 3 ounces, paraffin $\frac{1}{2}$ ounce, oil tar 2 ounces, oil pennyroyal 1 ounce, carbolic acid 2 drachms. Melt the solid ingredients and, when nearly cold enough to begin to solidify, incorporate the other ingredients.

To prevent Flies from lighting on marble or glass. Put a few drops of oil of wintergreen or pennyroyal on a damp sponge and rub over the surface; they will not light where this is done, but it must be repeated every four hours or so.

Other Poisons. For potato bugs Paris green or London purple seem to be the most successful. The same are also used for codling moths, and curculio on trees and shrubbery. For lice on plants insect powder is good, but washing with a spray of whale oil soap suds seems to be the most effective. For squash and cucumber bugs calomel is used.

FOODS.

A few preparations are known as foods for various purposes, as Baby Food, Infant Food, Plant Food, Egg Food etc. The following are some of the popular preparations:

Infants and Invalids Food. These foods are prepared from various grains in various ways; the object being to secure in them the most

valuable constituents of the food, and to present them in the form most readily digestible. To this end the grains are variously treated, by malting, removing some of the less valuable constituents, concentrating etc. As these processes require expensive machinery and experience, they are not adapted to the use of druggists, and are, therefore, not given here.

Plant Food. For making plants grow and blossom, the following are used:

Ammonium sulphate 4 ounces, sal nitre 2 ounces, sugar 1 ounce, hot water 1 pint. Mix and dissolve, keep in a well-stoppered bottle. A little is added to the water used for plants. Another formula is potassium nitrate 2 parts, calcium carbonate (precipitated chalk), sodium chloride, calcium phosphate, each, 1 part; iron silicate 3 parts, water 20 parts. Mix.

INKS, BLUINGS AND BLACKINGS.

A great variety of inks, bluings and blackings are found on the market. The following formulæ make good preparations of this kind. It must be remembered, however, that there are many qualities of anilines and other substances used in making inks etc., which have the same name, but are of different degrees of excellence. The best should always be chosen.

In the limited space only a few formulas can be given, but they will be sufficient.

Inks.

Fine Black Aniline Ink. Negrosine (black aniline crystals) $\frac{3}{4}$ ounce, dextrin $\frac{1}{2}$ ounce, corrosive sublimate 2 grains, water 2 pints. Dissolve the negrosine in a pint of hot water; dissolve the dextrin and corrosive sublimate in the remaining pint of water and mix the solutions. This ink flows freely, is always black and does not mold. By using a less quantity of aniline a very good ink may be made but it is not so black.

Carmine Ink. Carmine, No. 40, 80 grains; potassium carbonate (sal tartar) 80 grains, gum arabic, in powder, 80 grains; formaldehyde 1 fl.drachm, water 16 fl.ounces. Rub the carmine, sal tartar and gum arabic together in a mortar and, having added the formaldehyde to the water, rub the powder in the mortar with separate portions of the solution until all is added. This makes an excellent red ink.

Fine Red Aniline Ink. Eosine aniline 180 grains, water 2 pints. Dissolve the eosine in the water. This is a brilliant, bright, fiery red ink. It is put up and sold as "Carmine Ink," but is much better and cheaper than it.

Fine Violet Aniline Ink. Violet aniline 120 grains, alcohol $\frac{1}{2}$ ounce, dextrin $\frac{1}{2}$ ounce, hot water 2 pints. Put the aniline in a bottle with

the alcohol and add the hot water in which the dextrin has been dissolved. Different shades of violet, ranging from reddish to blue, may be obtained and various shades of ink may be made. The letters B and R signify the proportions of blue and red used; the "blue shades" are preferred.

Other aniline inks may be prepared in the same manner as the foregoing.

Blue Ink. Water-blue aniline $1\frac{1}{2}$ drachms, dextrin $\frac{1}{4}$ ounce, hot water 2 pints.

Green Ink. Green aniline 2 drachms, dextrin $\frac{1}{4}$ ounce, hot water 2 pints.

Purple Ink. This may be made like violet ink. It is in fact the same as the bluish-violet.

Red Aniline Ink. This may be made from red aniline (fuchsin) $\frac{1}{2}$ ounce, alcohol 2 ounces, dextrin $\frac{1}{2}$ ounce, hot water 2 pints. It is not so good as the eosine red ink. Scarlet red ink may also be made from scarlet aniline.

Black Ink, Logwood. School Ink. Extract of logwood 3 ounces, potassium bichromate 3 drachms hydrochloric acid 4 fl.drachms, water 1 gallon. Boil the extract with the water and potassium bichromate in 1 quart of water until dissolved, add the hydrochloric acid to the balance of the water and mix the solutions while warm.

This ink flows nicely and has a good color.

Fountain Pen Ink. This may be made from a special aniline dye made for that purpose, by dissolving $\frac{1}{2}$ ounce of the dye in 16 fl.ounces of water, or it may be made from Navy Blue Diamond dye for wool by dissolving the contents of one package in 16 fl.ounces of boiling water and after standing, pouring off the liquid free from sediment. This makes a very satisfactory fountain pen ink.

Japan Ink. This may be made by boiling borax 3 drachms, shellac 1 drachm, sugar 2 drachms for 1 hour in a pint of water, then straining the solution and dissolving in it $\frac{1}{2}$ ounce negrosine or black aniline. This does not flow so freely as other inks, but is very black and glossy.

Black Gloss Ink may be made from any other good black ink by adding to it gum arabic and sugar or a strong solution of shellac and borax as above. The very finest Japan ink may be made by dissolving fine India ink by rubbing it with a solution of shellac as above made until it is of the proper consistence and color.

Other colored inks may be made gloss inks in the same manner.

Liquid India Ink. This is prepared with stick India ink by rubbing it down on a plate or other glazed surface until an ink of the proper shade and consistence is obtained. The finest Stick India Ink is made of the finest lampblack made into a paste with an infusion of certain native albuminous seeds of China or Japan, and then moulded into sticks. The more common kinds are made up with glue, gelatin etc.

Violet-Black Ink. Violet Ink passing to Black. Extract of logwood 3 ounces, potassium bichromate 3 drachms, alum 2 ounces, lime water 1 pint, ammonia water 8 ounces, commercial hydrochloric acid, by weight, 1 pound; iron filings or old scraps of nails 1 pound, gum arabic 3 ounces, water 1 gallon. Boil the extract of logwood and potassium bichromate in 1 quart of water until dissolved, add the alum previously dissolved in 1 quart of hot water, then add the lime water, then the ammonia water; stir thoroughly and gradually add the hydrochloric acid with constant stirring, then add the remainder of the water in which the gum arabic is dissolved and pour the mixture upon the scraps of iron in an open vessel or crock. Let stand several days and decant.

Writing Fluid, Blue-Black. Apello nutgalls, coarsely ground, 1 pound, iron sulphate, copperas, 5 ounces, gum arabic 4 ounces, boric acid $\frac{1}{2}$ ounce, extract of indigo 1 ounce, picric acid 1 drachm, water sufficient to make 1 gallon. Macerate the nutgalls in 1 gallon of water for 12 hours, then boil in a kettle for 1 hour and pour off the decoction, add half a gallon of fresh water to the dregs and boil again for half an hour and pour off the liquid, press the residue and mix the product with the previous decoction. This will make about 1 gallon of liquid; to this, while still warm, add the remaining ingredients and dissolve; add water if necessary to make 1 gallon and, after standing 12 hours or more strain through a coarse muslin strainer. This is a good writing fluid, similar to those most popular in the market.

Many formulas might be given but this will be sufficient. The color may be varied by using more or less indigo extract or picric acid.

Copying Ink, Black. For Moist Sheets. By adding a little gum arabic and sugar to almost any of the foregoing inks, fair copying inks may be made, but the best copying ink may be made from the writing fluid last given by adding to each pint 1 ounce of sugar and $\frac{1}{2}$ ounce gum arabic.

An excellent copying ink may also be made from the violet-black ink by adding to each pint $\frac{3}{4}$ ounce each of sugar and gum arabic. This is similar to the popular French Copying Ink.

Colored Copying Inks. Most of the high-colored aniline inks make good copies without the addition of other ingredients. If anything is required, however, $\frac{1}{2}$ ounce of gum arabic in a pint is usually sufficient. Care must be taken not to make the sheets too wet for copying colored inks, as they are apt to blur.

Copying Inks for Dry Paper. Inks are sometimes wanted for "dry copying" as it is termed. This depends upon the ink altogether, which may be made by adding to any of the regular black or colored writing inks from 3 to 4 ounces of glycerin in each pint, or by making the same inks and using 3 ounces of glycerin instead of the same quantity of water in a pint.

The writing is to be quickly done, without blotting and without shading and the copy taken at once.

Chromograph or Hectograph Inks. These inks are designed to be used on the hectograph or copying pad, by which a hundred or more copies or duplicates may be made from one writing.

Black, Blue, Red and Violet may be made in the same manner, but the violet is most used because a much larger number of clear copies may be made from it. The formula is as follows: Violet (or other) aniline $\frac{1}{2}$ ounce av., alcohol $\frac{1}{2}$ fl.ounce, white sugar $\frac{1}{4}$ ounce av., glycerin 1 ounce av., water 6 fl.ounces. Mix the aniline with the alcohol and add the glycerin; dissolve the sugar and add. Of black aniline or negrosine double the quantity is required.

Hectograph Copying Pad. Hectograph copying pads should be made somewhat softer for winter use than for summer, which can be done by adding a little larger proportion of glycerin. Good glue 4 ounces, glycerin 16 ounces, water 8 ounces. Break up the glue and soak in the water for a few hours, then heat by water-bath until melted and add the glycerin and heat together for some time to evaporate part of the water, then strain into a shallow square tin to make the desired shape, and skim with a card to free from bubbles. This is improved by adding 1 ounce barium carbonate to the liquid while warm.

The writing to be copied is done with hectograph ink and transferred to the pad, sheets of paper are then put on and copies made.

Indelible or Marking Ink. For marking linen. Silver nitrate $3\frac{1}{4}$ ounces, sodium bicarbonate $4\frac{1}{2}$ ounces, stronger ammonia water $3\frac{1}{2}$ ounces, tartaric acid $1\frac{1}{8}$ ounces, archil 1 ounce, powdered acacia $2\frac{1}{2}$ ounces, soluble sap gum (or dextrin) 1 ounce, sugar $1\frac{1}{2}$ ounces, water sufficient to make 20 fl.ounces. Dissolve the silver and soda salts, each separately, in 2 pints of boiling water, and mix the solutions. Allow the precipitate to settle, decant the fluid and collect the precipitate on a paper filter, wash it with a pint of water and, when drained, transfer it to a mortar, then add the acid and mix. When effervescence has ceased add the stronger ammonia water and transfer the whole to a bottle containing the sugar. Now dissolve the sap gum or dextrin in 4 ounces of water, and the archil by the aid of heat. Add the acacia to the mixture, stir until dissolved and strain. Add the ammoniacal solution to this and make up to 20 ounces with water.

Indelible Laundry Ink. Sodium carbonate (sal soda) 1 ounce av., silver nitrate $\frac{1}{2}$ ounce av., acacia, powdered, $\frac{3}{4}$ ounce av., ammonia water 1 fl.ounce, distilled water 4 fl.ounces. Dissolve the sodium carbonate in the distilled water and rub with the powdered acacia in a mortar. Dissolve the silver nitrate in the ammonia water and mix with the mucilage. Transfer to a flask of double the capacity of the liquid, stop closely and heat by means of a water-bath to boiling, leaving the stopper loose during the latter part of the operation.

Indelible Ink for Stamp or Stencil. Negrosine 1 ounce, tannin 2 drachms, glycerin 4 ounces, ammonium vanadate 10 grains. Mix and dissolve. Other colors may be made from other anilines.

Another may be made from asphaltum 1 ounce, oil of turpentine 4 ounces, black printing ink 4 ounces, iron chloride $\frac{1}{2}$ ounce. Mix, dissolve and rub them well together.

Marking Ink for Packages and Boxes. Extract logwood 1 pound, potassium bichromate $1\frac{1}{4}$ ounces, hydrochloric acid $1\frac{1}{2}$ ounces, dextrin 8 ounces, water 1 gallon. Boil the extract with the water, add the potassium bichromate and the acid, and lastly the dextrin. Allow to stand and decant.

Marking Ink for Cotton Bales etc. Logwood extract 1 pound, copperas 10 ounces, potassium bichromate $1\frac{1}{2}$ ounces, hydrochloric acid 2 ounces, brown sugar 1 pound, water 1 gallon. Boil the extract with the water, add the potassium bichromate, then the iron and acid, and lastly the sugar. After standing decant.

Marking Ink in Cakes. For Brush or Stencil. These are made by rubbing some pigment with dextrin or gum arabic in solution and running the solution into boxes or molds. They are the same as water-color paints, and are to be used by wetting their surface with water and the brush rubbed over them. Make a thick mucilage of dextrin or gum arabic and stir in the pigment to a stiff paste. For black use drop or ivory black; for blue soluble Prussian blue or ultramarine blue, for green chrome green, for fine red rose pink, scarlet lake or carmine, for cheap red Venetian red, red lead etc.

Stamping Inks for Rubber Stamps. These are prepared from the anilines by mixing with glycerin $\frac{1}{4}$ ounce of aniline to 4 ounces of glycerin. Black, blue, green, red and violet are the anilines usually used for this purpose. The same inks made in this manner may be used for marking pens. Cheaper inks for rubber stamps may be made with drop black, Prussian blue, chrome green, rose pink etc., but they are not in general favor.

Ink Powders. These are prepared for quickly making inks by the addition of hot water. They are usually put up in packages sufficient to make a pint of ink, which requires from a teaspoonful to a tablespoonful of the powder. The following are the colors usually required:

Black. Negrosine, in crystals, 1 part; dextrin 3 parts.

Blue. Water-blue aniline 1 part, dextrin 5 parts. This may also be made with Prussian blue 1 part, dextrin 2 parts.

Green. Green aniline 1 part, dextrin 4 parts.

Red. Eosine aniline 1 part, dextrin 1 part.

Ribbon Inks. Ribbon inks for typewriters, dating stamps etc., are prepared by saturating thin silk with a solution of some aniline color in glycerin or some oily vehicle. The colors generally used are black, dark green, violet or purple. The solution may be made by dissolving

$\frac{1}{4}$ ounce of the aniline in a mixture of alcohol 2 fl.ounces, oleic acid 2 ounces, lavender oil 1 drachm. The ribbon is saturated with this solution and dried.

Gold and Silver Inks. Take equal parts of gold leaf (or silver leaf) and honey. Triturate them in a mortar until perfectly fine, then add about 30 parts of hot water and triturate. Allow to settle and pour off the water. Triturate again with fresh hot water. Allow to settle and pour off as before. Repeat the washing several times until the honey is all washed out, then dry the powdered gold leaf and mix it with water and gum arabic. It must be shaken occasionally while writing.

Very fine bronze may be made into ink by adding water and gum arabic and shaking occasionally while writing.

White Ink. For writing on black cards and some other purposes white ink is sometimes desired. It may be made by rubbing flake white 6 drachms with acacia mucilage 3 drachms, and enough water to make 1 fl.ounce. It may be shaken up before using.

Horticultural Inks. For writing on Metal. This ink is prepared for writing on metal tags for labeling plants, trees etc. Blue vitrol 1 ounce, sal ammoniac $\frac{1}{2}$ ounce, both in powder, dissolve in $\frac{1}{2}$ pint of strong vinegar. This may be used on zinc or iron strips or steel; a quill should be used for writing.

Aluminum strips of metal may be used. They should be first wiped with a little weak solution of caustic potash or soda to remove all grease, then written on with an ink prepared with hydrochloric acid diluted with an equal measure of water and colored with black ink. A steel pen may be used for the writing. This metal remains bright and retains the writing for a long time.

Liquid Slating for Blackboards. Shellac 8 ounces, lampblack $1\frac{1}{2}$ ounce, ultramarine blue $2\frac{1}{2}$ ounces, powdered rottenstone 4 ounces, powdered pumice stone 6 ounces, alcohol 4 pints. Dissolve the shellac in the alcohol, add the other ingredients and mix them well together, apply quickly with a flat varnish brush.

Carbon Duplicating Paper. Lard 10 ounces, beeswax 2 ounces, Canada balsam $1\frac{1}{2}$ drachms, lampblack sufficient. Melt the lard, wax and balsam together and add enough lampblack to make the desired color. This is applied to firm thin paper with a flannel dauber, and wiped off with clean rags. Be careful to coat evenly.

Ink Erasing Fluid.

Fluids for erasing ink are somewhat in demand and may readily be made by druggists.

Ink Eraser. One preparation. Solution of chlorinated soda (Labarraque's Solution) 2 parts, water 1 part. Mix them. This is to be applied and as soon as the ink disappears the moisture absorbed with clean blotting paper.

Ink Eraser. Two preparations. No. 1. Hydrochloric acid 1 ounce, water 1 gallon. Mix them.

No. 2. Solution of chlorinated soda 2 parts, water 1 part. Mix them. To erase the ink apply No. 1 with the end of a penholder, and then apply directly No. 2, and when the ink has disappeared absorb the moisture with clean blotting paper.

Bluings.

These are made both dry and liquid. The dry bluings, aside from indigo, consist of soluble Prussian blue, and the liquids are solutions of the same in water. They may be prepared as follows:

Dry Bluing. Prussian blue 4 parts, oxalic acid 1 part. Powder the oxalic acid and mix them well together. If soluble Prussian blue is used, no acid is necessary. This is put up in various ways for the market.

Liquid Bluing. Soluble Prussian blue 1 ounce, oxalic acid $\frac{1}{4}$ ounce, boiling water 1 quart. Dissolve the salts in the water.

Blackings and Shoe Dressings, Etc.

A great variety of Blackings and Shoe Dressings, good, poor and bad, are found on the market. We have space only to give two or three good formulas.

Shoe Blacking. French Blacking. The paste shoe blackings of the market are all made in the same general way, by combining some elastic substances with oils, driers, black pigments etc. The difference in them consists mainly in the quality of the materials used and the skill with which they are compounded. The following will make a good blacking: Dissolve India rubber, cut fine, 2 ounces, in cotton seed oil 1 pound, by the aid of heat; and add to the solution ivory black, in very fine powder, 7 pounds; molasses 5 pounds, gum arabic, in powder, 2 ounces; strong vinegar 22 fl.ounces. Mix them thoroughly and grind the mixture through a paint mill, then add sulphuric acid $1\frac{1}{3}$ pounds, and stir daily for a week or more, or heat gently and incorporate the acid while warm. The use of sulphuric acid in this blacking is not objectionable as it is neutralized by the lime salts contained in the ivory or bone black used.

Liquid Paste Blacking. A liquid blacking may be made by melting the above and mixing it with good vinegar, say 3 gallons for the above quantity. This is not like the popular shoe dressings on the market.

Shoe Dressing. Shellac, dark colored, $1\frac{1}{2}$ pounds, sal soda, crystals, $6\frac{1}{2}$ ounces; gum arabic 4 ounces, negrosine (black aniline) $\frac{3}{4}$ ounce, water sufficient to make 1 gallon. Put the sal soda in half a gallon of water and heat to boiling, add the shellac to the boiling solution and continue the heat for 10 or 15 minutes until all the shellac has been dissolved that will be (there is a small portion left undissolved), then

add the negrosine and a pint of water in which the gum arabic has previously been dissolved. When cool strain and add enough water to make a gallon.

This is similar to most of the "patent" shoe dressings on the market. It may be made to dry more quickly by adding a little alcohol. This is usually put up in 4 ounce bottles with a cork through which a wire is inserted with a small sponge attached.

Bronze Shoe Dressing. Add to the foregoing $\frac{1}{2}$ to $\frac{3}{4}$ ounce of red aniline in a gallon, and dissolve by gentle heat. Some other colored anilines will also make a bronze finish.

Patent Leather Dressing. This is designed to give a finish like patent leather, and is water-proof. It may also be used as a belt polish and for other similar purposes. India rubber $\frac{1}{4}$ ounce, shellac 4 ounces, camphor $\frac{1}{2}$ ounce, negrosine $\frac{1}{2}$ ounce, wood alcohol 12 fl. ounces. Dissolve the rubber by heat of a water-bath in the wood alcohol, then add the other ingredients and dissolve.

Government Harness Dressing. Neatsfoot oil 1 gallon, bayberry tallow 2 pounds, beeswax 2 pounds, beef tallow 2 pounds, castor oil $\frac{1}{2}$ gallon, lampblack 1 ounce. Melt together the wax and tallow and add the oils and lampblack. When thoroughly mixed, strain through muslin.

Waterproof Blacking. For greasing boots, making them water-proof etc. Neatsfoot oil 1 gallon, beeswax 2 pounds, shellac $\frac{1}{2}$ pound, beef tallow 8 pounds, castor oil 1 quart, lampblack $\frac{1}{4}$ pound. Melt and mix them as the preceding.

Petrolatum Shoe Dressing. Petrolatum 12 ounces, yellow wax or cerasin 3 ounces, lampblack 2 ounces. Melt the petrolatum and wax together, stir in the lampblack and, while cooling, add sufficient nitrobenzol or other flavoring to perfume the dressing, then pour into boxes. This is similar to the shoe dressing now used, of which a small quantity is rubbed over the shoe and polished off with a cloth.

POLISHING PREPARATIONS.

Among the preparations put up and sold by druggists and others connected with the business are a great variety of polishes of different kinds, and for various uses. The following are formulas for the most important ones:

Furniture Polish.

For restoring the color or luster of furniture, preparations are designed to be applied with a cloth and rubbed until dry.

Furniture Cream. Common white soap 150 grains, sal tartar 60 grains, white wax $2\frac{1}{2}$ ounces, water 5 fl. ounces, oil of turpentine 10 ounces. Melt the soap in the water by the heat of a water-bath, add the sal tartar and then the white wax. When the wax is melted re-

move from the fire and slowly add, with constant stirring, the oil of turpentine, mixing them thoroughly while cooling. This is to be applied with a cloth and rubbed down with Canton flannel.

Furniture Polish. Linseed oil 6 fl.ounces, alcohol 3 fl.ounces, shellac 1 ounce av., "butter" of antimony $1\frac{1}{2}$ fl.ounces, hydrochloric acid $\frac{1}{2}$ ounce, oil of turpentine 5 fl.ounces. Dissolve the shellac in the alcohol and mix with the linseed oil and turpentine, then, having mixed the hydrochloric acid and "butter" of antimony, add them to the preparation and mix thoroughly. Apply as the preceding.

Glass Polish.

For polishing glass, mirrors and bright ware, as silver-plated ware etc., the following are recommended:

Glass and Silver Polish. Prepared chalk 3 ounces, alcohol, ammonia water and water, each, 3 ounces. Mix them by rubbing the chalk to a smooth paste with the liquids.

Glass Polish. Calcined magnesia mixed with gasoline into a liquid of the consistence of cream is excellent for polishing plate glass, mirrors etc. Calcined magnesia made up into balls with powdered soap is also a good preparation for this purpose.

Silver Polish.

The following are recommended for polishing silver and nickelplated ware etc. They make fine polishes that will not scratch:

Silver Polishing Liquid. Prepared chalk 1 pound, crocus martis 4 ounces. Mix well together and to make up put 1 ounce of the mixture in a 4-ounce bottle, add 1 ounce ammonia water and water enough to fill the bottle. Shake the bottle before using and apply with a cloth, then rub off when dry with another cloth.

Silver Polish Powder. Rouge or fine crocus martis 1 ounce, fossil silica 4 ounces, prepared chalk 1 pound. Rub the fossil silica to a fine powder and mix intimately with the chalk. This will not scratch the finest surface. A cheaper powder may be made of whiting and rotten stone, or by using prepared chalk alone.

Silvering Solution or Polish. Potassium cyanide 2 ounces, silver nitrate 1 ounce, or a sufficient quantity; distilled water 12 ounces, precipitated chalk 2 ounces. Dissolve the potassium cyanide in the water and add to it a concentrated solution of silver nitrate as long as the precipitate first formed is redissolved, then add the chalk and mix them thoroughly. This serves as a plating and polish for silver.

Gilding Solution. This is made in the same manner as the foregoing, only gold chloride and sodium is used instead of silver nitrate.

Polishes for Brass and Metal.

The foregoing polishes may also be used on brass and metals, but do not "take hold" like the following:

Polishing or Putz Pomade. Iron subcarbonate 6 ounces, fossil silica 2 ounces, petrolatum 1 pound, cotton seed oil 2 ounces, oil of mirbane or essential oil of almonds 40 minims. Reduce the fossil silica to a very fine powder and mix it with the iron, melt the petrolatum, add the cotton seed oil and stir in the powders, run through a sieve and while cooling add the flavoring oils and stir until ready to set, then run into boxes.

Instead of fossil silica, prepared chalk or whiting may be used.

This is applied with a rag and well-rubbed, then wiped off with a clean cloth and the surface polished with a little whiting.

Polishing Liquid. For brass, copper etc. Oxalic acid 1 ounce, crocus martis 2 ounces, whiting 4 ounces, water 1 pint. Mix. Shake before using, apply by rubbing and polish dry with whiting. The same substances may also be used dry, or applied with a little oil and rubbed dry with whiting.

Barkeeper's Friend. Whiting 8 ounces, gasoline 1 pint. Rub them together to a smooth paste. Shake before using. Apply, allow to dry on the metal and polish off with a cotton flannel cloth. Two ounces crocus martis may be used in place of an equal quantity of whiting.

For Polishing Tin. Mix oxide of tin 1 part with whiting 3 parts and polish by rubbing with the powder.

Tripoli. This is a gritty polishing substance made by calcining flint and reducing to a powder. Ordinary lime water is used for the same purpose. They are not intended for fine, highly-polished surfaces, but for brightening and scouring.

Stove Blacking or Polish. Stove blacking, as it is known in the market, is simply black lead, amorphous graphite or plumbago, variously prepared and molded, pressed or cut into shape. It is obtained from mines and consists of carbon mixed with iron, the mixture often being called carbide or carburet of iron. It is finely ground and made into a stiff paste, molded into bricks or other convenient form and dried. It is also furnished in the form of paste and run into boxes.

Laundry Polish.

For giving a gloss to linen, preparations are put up in the form of liquids, also in cakes of wax. They are mixed with the starch when made, and the polish is secured by ironing with a rounded polishing iron.

Laundry Wax or Polish. Starch gloss. White wax, paraffin, spermaceti, stearin, powdered gum arabic, equal parts. Melt the wax and, while cooling stir in the powdered gum arabic and run into molds. Two drachms of this wax boiled with a pint of starch and thoroughly mixed with it is the proper proportion for polishing, half the quantity suffices for ordinary polishing.

Paraffin alone is used for the same purpose.

Liquid Starch Glace. White wax 1 ounce, spermaceti 1 ounce, gum arabic 1 ounce, borax 1 ounce, water 10 ounces, oil of cloves 10 drops. Dissolve the borax and gum arabic in the water, melt the wax and spermaceti and while liquid rub with the solution of borax etc. to make an emulsion, mixing them thoroughly. A tablespoonful or two of this liquid in a pint of starch gives a fine polish. It may also be applied after starching by rubbing over the starch with a cloth, and then polishing with a hot iron.

VARNISHES.

For coating and finishing the surfaces of wood, metals, glass, labels, pictures etc., solutions of resins of various kinds in spirits or oils are employed. Most of these varnishes are purchased of manufacturing houses which make them in large quantities, but some of them are readily prepared and considerably used by druggists, among which are the following. Some other varnishes have been mentioned elsewhere.

Label Varnish. This may be made by dissolving pale shellac 6 ounces in 12 fl.ounces of alcohol by the aid of heat and adding to the warm solution 1 pint of linseed oil and 2 drachms of zinc chloride, agitating them until the zinc salt is dissolved. It is applied with a brush, or by dipping the label or floating it.

A spirit varnish made with sandarach, shellac and alcohol may also be used.

Spirit Varnish. Sandarach 3 ounces, pale shellac 2 ounces, alcohol 20 fl.ounces. Dissolve and add copal varnish 2 ounces, mix well, strain through gauze, set aside for a month and decant the clear portion from the sediment. This is used for labels, pictures, water colors, lithographs etc.

Shellac Varnish. For "killing" knots in wood for polishing and many other purposes shellac varnish is used. It is simply shellac dissolved in alcohol. About 3 pounds of shellac with sufficient alcohol to make a gallon. It is used thinner for some purposes.

Transfer Varnish. Mastic, sandarach, each, 2 ounces; alcohol 15 fl.ounces. Dissolve and add pure Canada balsam 4 ounces. This is used for transferring engravings, lithographs, decalcomania pictures etc., and for gilding, silvering, bronzing etc.

Other Varnishes. Of the other varnishes that are used Damar varnish is made by dissolving gum or resin damar in oil of turpentine. Copal varnish is made by dissolving copal in oil of turpentine. This is also known as Furniture Varnish and Carriage Varnish, many varieties being made from different qualities of gum or resin. Mastic varnish may be made by dissolving mastic either in alcohol or oil of turpentine.

Crystal varnish is made from Canada balsam mixed with an equal volume of oil of turpentine. It is also known as map varnish and is used diluted with oil of turpentine for making tracing paper. Wax varnish is prepared by melting 2 ounces of wax with 6 ounces of oil of turpentine and mixing with a pint of copal varnish.

Sealing wax varnish is made from shellac sealing wax dissolved in alcohol. It is used for chemical and electrical apparatus, cork tops etc. Many other varnishes are known and used.

Glass varnish—for making a film on glass the wax varnish above is good. A transparent varnish for glass is made of sandarach and mastic, each 2 ounces dissolved in alcohol 20 ounces.

Paint and Varnish Remover. Acetone 3 fl.ounces, crude fusel oil (amylic alcohol) 3 fl.ounces, wood alcohol 6 fl.ounces, gasoline 4 fl.ounces, carbon bisulphide 2 ounces. Mix them. This is similar to a preparation called "Ad-el-ite."

UNCLASSIFIED PREPARATIONS.

Liquid Court Plaster. This may be made by dissolving resin plaster (adhesive plaster) 4 parts by the heat of a water-bath in gasoline 2 parts, adding a little more gasoline so that the finished product will have the consistency of syrup. This is applied and the gasoline evaporates, leaving a thin coating of the elastic plaster.

Battery Solutions or Fluids. The solution most commonly used for batteries of zinc and copper, which are called gravity batteries, is a solution of copper sulphate (blue vitriol) in water, sufficient of the salt being used to leave a small portion undissolved in the bottom of the jar. The batteries with carbon and zinc plates, known as high resistance batteries, are charged with battery fluid made with potassium bichromate 1 part, sulphuric acid 2 parts by weight, water 10 parts; the zincs being amalgamated with mercury. The Leclanché battery, which has a porous cup filled with carbon, and a zinc anode, is charged with a solution of ammonium chloride about 1 part to 4 parts of water. Small batteries for medicinal use are usually made with copper and zinc and charged with a solution of mercury sulphate. Platinum batteries are charged with the same, some mercury being left in the bottom of the jar, which keeps the zincs amalgamated. Many other kinds of batteries are known and used, but these mentioned are the most common.

Silvering Solution. For silvering the inside of glass vessels, vases etc., the following solution is used:

No. 1. Distilled water 12 fl.ounces, Rochelle salt 12 grains, silver 16 grains. Dissolve the Rochelle salt in the water and heat to boiling, then add the silver nitrate dissolved in 1 ounce of distilled water, and continue the boiling for 10 minutes, adding enough distilled water, when cold, to make the measure 12 fl.ounces.

No. 2. Distilled water 10 fl.ounces, silver nitrate 1 ounce, ammonia water a sufficient quantity, alcohol 1 fl.ounce. Dissolve the silver salt in the water and add enough ammonia water to nearly but not quite dissolve the precipitate first formed; lastly add the alcohol and distilled water to make the measure 12 fl.ounces.

Allow the solutions to stand several days, then mix equal parts of each and pour into the glass vessels desired to be silvered, or, for making mirrors, lay glass flat on the surface of the solution.

Soldering Solution. Hydrochloric acid 5 fl.ounces, zinc, in small pieces, a sufficient quantity; sal ammoniac 1 ounce av. Add the zinc to the acid until nearly all has dissolved that will, then add the sal ammoniac and heat to a simmer for 5 minutes. For making solder flow freely.

Plating Solutions.

For electro-plating with silver, nickel, gold etc., it is necessary to use batteries to generate the electrolytic action, and deposit the metals from their solutions upon the surfaces which are to be plated. The details of the processes are too voluminous to be repeated here, and the solutions from which the metal is deposited can only be briefly mentioned.

Silver-Plating Solution. This may be made with potassium cyanide 4 ounces av., silver cyanide $1\frac{1}{4}$ ounces av., water 160 fl.ounces.

Gold-Plating Solution. This may be made with potassium cyanide 1 pound av., gold cyanide $\frac{7}{132}$ ounce av., water 160 fl.ounces.

Nickel-Plating Solution. This may be made with double salts of nickel (sulphate of nickel and ammonium) 4 ounces, water 160 fl.ounces.

Many other plating solutions are used, and the metal is deposited in various ways on different articles.

Plating Liquor is intended to brighten and increase the luster of plated-ware. It is made by dissolving 1 ounce each of alum, cream of tartar and salt in 80 fl.ounces of water. The articles are to be boiled in the liquor.

Permissible Aniline Colors.

Besides the colors mentioned under the title Colores in Part II. of this work, the following coal-tar colors are now permitted by the U. S. Government as harmless ingredients in beverages, foods and medicines; the numbers of the dyes preceding their names are as listed by Green:

Red shades: 107, Amaranth; 56, Ponceau 3 R; 517, Erythrosin.
Orange shades: 85, Orange 1. **Yellow shades:** 4, Naphthol yellow S.
Green shades: 435, Light green S. F. yellowish. **Blue shades:** 92, Indigo disulpho acid.

A circular has recently been issued by the U. S. department of agriculture giving methods for the examination of these seven permitted colors and their identification when occurring in mixtures.

The French government allows 21 coal-tar colors to be used, they are as follows: **Rose**: (1) Elosine, (2) Erythrosine, (3) Rose Bengale. **Red**: (4) Bordeaux B, (5) Ponceau crystallized, (6) Bordeaux S, (7) New Coccine, 8 solid red, 9 Ponceau RR, (10) Scarlet R, (11) fuschine, acid. **Orange**: (12) Orange 1. **Yellow**: (13), (14) Chrysoine, 15 Auromine O. **Green**: (16) blue, (19) patent blue. **Violet**: 20 Paris violet, (21) acid violet.

Purifying Bees' Wax. Melt 10 pounds of wax with 1 pint of vinegar and a quart of water; when melted strain and wrap the vessel and cover it with several thicknesses of cloth so that it will cool slowly. All sediment settles to the bottom and may readily be scraped off.

Prepared Corks. Corks may be prepared for resisting the action of acids etc. by immersing them in melted paraffin, and when removed putting them at once into cold water; this gives them a coating of paraffin and fills all cavities, making them impervious to acids etc.

Burnt cork may be prepared by placing a quantity of corks in an iron kettle, covering closely and heating them until they are reduced to charcoal; they may then be powdered.

Bleaching Sponges. To bleach sponges first dip them in a solution of potassium permanganate 1 ounce in 1 gallon of water, squeeze out the water as much as possible, then pour upon them a solution prepared with sodium hyposulphite 1 pound, water 7 pints, hydrochloric acid 1 pint, until they are white, then to prevent turning yellow when dry dip in a solution of 2 drachms sodium bicarbonate in 1 gallon of water and drain.

Sulphur Lotion. Zinc sulphocarbolate 20 grains, zinc oxide 120 grains, lac sulphur 60 grains, cologne 1 ounce, glycerin 1 ounce, rose water 5 ounces. Rub the zinc oxide with the lac sulphur and then with the cologne; add the glycerin and rose water in which the zinc carbolate has been dissolved.

Curry Powder. Coriander seed, turmeric, dessicated cocoanut, each, 4 ounces; cassia buds, fenugreek seed, poppy seed, each, 2 ounces; mustard, ginger, mace, each, 1 ounce; capsicum, allspice and garlic, each, $\frac{1}{2}$ ounce. Grind them all together to a fine powder. This is a fair imitation of the genuine Indian curry powder. Used for seasoning.

Celery Salt. Celery seed, in fine powder, 1 ounce; fine dry table salt 7 ounces. Mix them well together.

Pepper Sauce. This is conveniently made by adding good vinegar to whole bird pepper or capsicum contained in a pepper sauce bottle.

Worcestershire Sauce. The composition of this sauce is a trade secret, but a variety of similar sauces are found on the market. A good imitation may be made as follows: Chop the green outer covering of unripe walnuts 5 pounds, bruise them to a pulp in a mortar, pour upon them 6 pints of good strong vinegar and, after standing a day heat to boiling and strain with strong pressure. To the liquid thus obtained add garlic, grated to a pulp, 2 ounces; capsicum, in fine powder, 2 ounces; black pepper 1 ounce, cinnamon $1\frac{1}{2}$ ounces, nutmeg $\frac{1}{2}$ ounce, allspice 1 ounce, cloves $\frac{1}{2}$ ounce, all in fine powder; salt 12 ounces, brown sugar 8 ounces, and enough good vinegar to make 1 gallon of the finished product. This is to stand for some time, with frequent agitation, and then to be put up in bottles.

Sugar of Lemons. Citric acid 1 ounce, extract of lemon 1 ounce, sugar 1 pound. Powder the acid and mix thoroughly with the sugar, rub the extract of lemon first with a small quantity of the mixture and then with the remainder gradually added. A tablespoonful of this makes a small glass of lemonade.

INDEX.

This Index includes all drugs, chemicals and preparations official in the U. S. and Br. pharmacopœias, together with such other unofficial drugs and preparations as are essential or important to pharmacy or medicine in English-speaking countries.

In the Organic Materia Medica Section, (Part I., pages 106 to 236) vegetable and animal drugs are described under their Latin pharmaceutical names and appear in alphabetical order in this index. The botanical names of plants and the families to which they belong are given in the text, but are not generally given in this index.

In the Chemical Section (Part I., pages 237 to 326) are included all the chemical elements and their simple compounds and salts generally listed, but only those official or important to the trade appear in the index, the others may be found by referring in the Chemical Section to the chemical element from which they are formed. In Part II. of this work all the official chemicals, together with the more important unofficial salts and compounds, are described, and their names appear in this index.

Under the heading "Medical, Chemical and Pharmaceutical Terms," (pages 31 to 56) definitions useful in medicine, chemistry and pharmacy are given, alphabetically arranged in dictionary form. These are not generally included in this index.

Preparations allied to the drug trade but not a part of regular pharmacy will be found in Parts III., IV., V., VI., VII. They are included in this index in general alphabetical arrangement.

To avoid repeating names of drugs, chemicals etc., one or more dashes, indicating repetition of the word or words of the title, are used in this index.

A

Abbreviations and Signs, 17.

— Pharmaceutical authorities, 22.

— — references, 22.

Abies, 114.

— balsamea, 114.

— canadensis, 115.

— communis, 115.

— Douglasii, 115.

— excelsa, 115.

— Frazeri, 115.

— Menziesii, 115.

— pectinata, 115.

— picea, 115.

Abraum-salze, 261.

Abrie acid, 116.

Abrin, 116.

Abrus precatorius, 116.

Abscess root, 208.

— — fluidextract, 208.

Absinth, 117.

Absinthe, 1368.

— ordinary, 1369.

Absinthic acid, 117.

Absinthin, 117.

Absinthol, 117.

Absinthium, 116.

— ponticum, 116.

— tincture, 1033.

Absolute alcohol, 406.

— temperature scale, 78.

— zero, 78.

Absorbent cotton, 733.

Absorption, 81.

Abstracta, 328.

Abstracts, list of, 328.

Acacia, 117, 1304.

— bark, 118.

— mucilage, 820.

— — syrup, 636.

— syrup, 985.

— triple extract, 1295.

Acaciæ cortex, 118.

— gummi, 117.

Acalypha, 118.

Acalyphine, 118.

Acanthea, 118.

— viridis, 118.

Acerdol, 264.

Acetal, 328.

Acetals, 411.

Acetamid, 329.

Acetamide, 329.

Acetanilide, 329.

- Acetanilide elixirs, 542, 543.
 — powder comp., 904.
 Acetanilidum, 329.
 Aceta Medicata, 336.
 Acetate, 333.
 — ion, 333.
 — of iron, ethereal tinct., 1054.
 — — tincture, Rademacher's, 1054.
 Acetates, 332, 345.
 — chemicals, 332.
 — solutions or liquors, 332.
 Acetic acid, 345.
 — — diluted, 346.
 — — crystallizable, 347.
 — — glacial, 347.
 — aldehyde, 411.
 — fluidextracts, 332.
 — tinctures, 333.
 Acetification, 334.
 Acetocaustin, 363.
 Acetonal, 421.
 Acetone, 330, 968.
 — chloroform, 330, 502.
 — collodion, 330, 516.
 — salicylic ether, 331.
 — alcohol, 331.
 Acetoform, 330.
 Acetolados, 336.
 Acétole de colchique, 338.
 Acétoles, 336.
 Acetophenone, 331.
 Acetophenone-phenetided, 331.
 Acetophenonum, 331.
 Aceto-salicylate of antipyrine, 331.
 Acetopyrine, 331, 342.
 Acetozone, 331.
 Acet-para-phenetidin, 332.
 Acetphenetidin, 332.
 Acetphenetidinum, 332.
 Acetum, 333.
 — antisepticum, 336.
 — aromaticum, 337.
 — belladonnæ, 339.
 — Britannicum, 338.
 — camphoræ compositum, 338.
 — camphoratum, 337.
 — cantharides, 338.
 — colchici, 338.
 — — bulbi, 338.
 — — seminis, 339.
 — commune, 346.
 — crudum, 346.
 Acetum crudum cum acido carbolico, 339.
 — destillatum, 346.
 — digitalis, 339.
 — ipecacuanhæ, 339.
 — lavendulæ, 339.
 — lobeliæ, 339.
 — opii, 340.
 — — compositus, 340.
 — purum, 346.
 — pyrolignosum, 346.
 — radicale, 346.
 — rosarum, 340.
 — rosmarini, 339.
 — rubi idæi, 341.
 — rutæ, 339.
 — sabadillæ, 339.
 — scillæ, 341.
 — sanguinariæ, 341.
 — Thebiacum, 340.
 Acetyl, 342.
 — chloride, 342, 362.
 — ethoxy-phenyl-urethane, 342.
 — naphthalin, 342.
 — para-amido-salol, 342.
 — phenyl-hydrazin, 342.
 — salicylate of anti-pyrine, 342.
 — — methyl, 342.
 — salicyl-phenetidin, 342.
 — salicylic acid, 342, 458.
 — tannin, 342.
 — trimethyl colchicine acid, 342.
 Acetylene, 342.
 Achillea, 118.
 Achilleic acid, 118.
 Achillein, 118.
 Acida—Acids, 343.
 Acid abric, 116.
 — absinthic, 117.
 — absolute, 344.
 — acetic, 345.
 — — crystallizable, 347.
 — — diluted, 346.
 — — glacial, 347.
 — achilleic, 118.
 — aconitic, 388.
 — acrylic, 390.
 — agaric, 121.
 — amylic, 388.
 — anacardic, 126.
 — anisic, 127.
 — antimonious, 253.
 — arabic, 117.
 — arsenic, 347.
 — arsenious, 347.
 — — solution, 772.
 Acid, arthanic, 194.
 — benzoic, 134, 348.
 — — lozenge, 1089.
 — bismuthic, 471.
 — boracic, 349, 474.
 — boric, 349, 474.
 — — ointment, 1095.
 — — solution, 955.
 — bromacetic, 478.
 — bromic, 359, 477.
 — butyric, 479.
 — cacodylic, 350.
 — camphoric, 140, 350.
 — camphoronic, 140.
 — carbazotic, 376.
 — carbolic, 351, 510, 864, 866.
 — — antidote, 352.
 — — crude, 351.
 — — crystallized, 351.
 — — ointment, 1095.
 — — solution, 948.
 — carbonic, 353.
 — — liquid, 353.
 — — true, 267, 353.
 — carminic, 151.
 — caryophyllic, 143.
 — cathartic, 222.
 — ceratic, 146.
 — chelidonic, 147.
 — chloric, 268, 503.
 — chlorous, 503.
 — chromic, 353, 506.
 — — solution, 772.
 — chrysophanic, 212, 354.
 — cinnamic, 150, 509.
 — citric, 354.
 — — solution, 948.
 — — syrup, 985.
 — cresolic, 529.
 — cresylic, 528, 866.
 — cubebic, 157.
 — cyanic, 364.
 — dextro-tartaric, 386.
 — dichloracetic, 362.
 — diethylbarbituric, 1114.
 — dioxysuccinic, 386.
 — dithionic, 387.
 — drops, Haller's, 381.
 — ergotinic, 164.
 — filicic, 132.
 — former, 343.
 — formic, 355.
 — — spirit, 968.
 — gallic, 356.
 — gallotannic, 355.
 — gaulthero-salicylic, 925.
 — gelsemic, 171.

- Acid glycerino-phosphoric, 357.
 — guaiac, 176.
 — guaiacic, 176.
 — guaiaretic, 176.
 — hydrazoic, 292.
 — hydriodic, 277, 357, 759.
 — — concentrated, 358.
 — — syrup, 985.
 — hydrobromic, 359.
 — — concentrated, 359.
 — — diluted, 360.
 — hydrochloric, 361, 503.
 — — diluted, 363.
 — hydrocyanic, 363, 531.
 — — diluted, 364, 531.
 — hydrofluoric, 273, 362.
 — — diluted, 366.
 — hypochlorous, 268, 503.
 — hypophosphorous, 297, 366, 868.
 — iodic, 277, 358, 759.
 — ipecacuanhic, 183.
 — juglandic, 185.
 — lactic, 367.
 — — diluted, 368.
 — lævo-tartaric, 386.
 — lithic, 1111.
 — maizenic, 235.
 — malic, 380.
 — manganic, 288.
 — meconic, 368.
 — metaboric, 475.
 — metaphosphoric, 297, 374, 868.
 — meta-tartaric, 386.
 — methylic, 356.
 — meso-tartaric, 386.
 — molybdic, 290.
 — monochlor-acetic, 362.
 — muriatic, 361.
 — — diluted, 363.
 — myrrhic, 197.
 — nascent phenic syrup, 1015.
 — nitric, 368.
 — — diluted, 370.
 — nitrohydro-chloric, 370.
 — — diluted, 371.
 — nitromuriatic, 370.
 — — diluted, 371.
 — nitrous, 371.
 — oleic, 371, 847.
 — ophelic, 148.
 — orthophenol-sulphonic, 379.
 — orthophosphoric, 297, 374.
 Acid, osmic, 372.
 — oxalic, 373.
 — oxysuccinic, 380.
 — pannic, 132.
 — paratartaric, 386.
 — pentathionic, 387.
 — perchloric, 503.
 — periodic, 277, 759.
 — perosmic, 294, 372.
 — phenol-salicylic, 925.
 — phosphate, 376, 952, 1138.
 — phosphoric, 297, 373.
 — — concentrated, 375.
 — — diluted, 375.
 — — glacial, 374.
 — — monobasic, 375.
 — phosphorous, 297.
 — phosphorous, 376, 868.
 — picric, 376.
 — potassium anti-moniatic, 297.
 — — tartrate, 895, 903.
 — prussic, 363, 531.
 — pyramidon cam-phorate, 910.
 — pyroboric, 475.
 — polygallic, 222, 910.
 — pyrophosphoric, 297, 374, 868.
 — racemic, 386.
 — rosalic, 429.
 — salicylic, 376, 925.
 — — ointment, 1095.
 — salicylous, 925.
 — salt, 344.
 — sclerotic, 164, 378.
 — selenic, 304.
 — selenous, 304.
 — silicic, 305.
 — solution mercuric nitrate, 785.
 — sozoiodolic, 378.
 — stannic, 318.
 — stearic, 379.
 — succinic, 379.
 — sulpho-carbolic, 315.
 — sulphuricinic, 315.
 — sulphovinic, 315.
 — sulphuric, 315, 380.
 — — aromatic, 381.
 — — diluted, 382.
 — sulphurous, 315, 383.
 — tannic, 384.
 — — ointment, 1095.
 — — troches, 1089.
 — tartaric, 385.
 — tartrates, 387.
 — telluric, 316.
 — tellurous, 316.
 — thiosulphuric, 387.
 Acid, titanio, 319.
 — trithionic, 387.
 — trichloracetic, 362, 387.
 — tungstic, 320.
 — uric, 1111.
 — valerianic, 232, 387.
 — valeric, 387, 1112.
 — vanadic, 321.
 Acide azotique officinal, 369.
 — bromhydrique dissous, 360.
 Acidification, 344.
 Acidimeter, 344.
 Acidimetry, 344.
 Acids, 343.
 — in pharmacy, 344.
 — of chlorine, 503.
 — of nitrogen, 293.
 — of phosphorus, 868.
 — of sulphur, 978.
 Acidum aceticum, 345.
 — — aromaticum, 346.
 — — camphoratum, 346.
 — — dilutum, 346.
 — — glaciale, 347.
 — arsenicum, 347.
 — arseniosum, 347.
 — benzoicum, 348.
 — boricum, 349, 474.
 — boroglycer-inatum, 350.
 — cacodylicum, 350.
 — camphoricum, 350.
 — carbolicum, 351.
 — — crudum, 352.
 — — liquefactum, 352.
 — carbonicum, 353.
 — chloronitrosum, 370.
 — — dilutum, 371.
 — chromicum, 353, 506.
 — chrysophanicum, 354.
 — citricum, 354.
 — formicum, 355.
 — gallicum, 356.
 — glycerino-phosphatum, 357.
 — hydriodicum, 357.
 — — dilutum, 358.
 — hydrobromicum, 359.
 — — dilutum, 360.
 — — gasiforme, 359.
 — hydrochloricum, 361.
 — — dilutum, 363.
 — hydrocyanicum, 363, 365.
 — — dilutum, 364.
 — hydrofluoricum, 365.
 — — dilutum, 366.
 — hypophosphor-ousum, 366.

- Acidum hypophosphor-
 osum dilutum, 366.
 — lacticum, 367, 705.
 — meconicum, 368.
 — nitricum, 368.
 — — crudum, 369.
 — — dilutum, 370.
 — — fumans, 369.
 — nitrohydro-
 chloricum, 370.
 — — dilutum, 371.
 — nitro-nitrosium, 369.
 — nitrosium, 371.
 — oleicum, 371, 847.
 — osmicum, 372.
 — oxalicum, 373.
 — phosphoricum, 373.
 — — concentratum, 375.
 — — dilutum, 375.
 — phosphorosum, 376.
 — picricum, 376.
 — salicilicum, 376.
 — scleroticum, 378.
 — soziodolicum, 378.
 — sozolicum, 379.
 — stearicum, 379.
 — succinicum, 379.
 — sulphuricum, 380.
 — — alcoholisatum, 381.
 — — aromaticum, 381.
 — — dilutum, 382.
 — sulphurosum, 383.
 — tannicum, 384.
 — tartaricum, 385.
 — thiosulphuricum, 387.
 — trichloraceticum, 387.
 — valericum, 387.
 Acme liquid soap, 1313.
 Acne lotion, 1290.
 Aconine, 388.
 Aconite, 390.
 — dialysate, 535.
 — elixir, 543.
 — fluidextract, 686.
 — liniment, 766.
 — tincture (leaves) 1035.
 — — (root), 1034.
 — — etherial, 1035.
 — — Fleming's, 1035.
 Aconitic acid, 388.
 Aconitina, 388.
 Aconitine, 119, 388.
 — nitrate, 389.
 — ointment, 1095.
 — oleate, 849.
 Aconitinum nitri-
 cum, 389.
 Aconitum, 118, 390.
 — Napellus, 118.
 Acorin, 139.
 Acoustic oil, 846.
 Acrolein, 390.
 Acryl, 390, 415.
 Acrylic acid, 390.
 Actæa, 119.
 — alba, 119.
 — racemosa, 119.
 — rubra, 119.
 — spicata, 119.
 — tincture, 1047.
 Active principles, 920.
 Actol, 306.
 Adansonia digitata, 119.
 Adder's tongue, 165.
 Ade drinks, 1341.
 Ad-el-ite, 1398.
 Adeps, 113, 119, 390.
 — benzoatus, 119, 392.
 — benzoinatus, 119, 391.
 — lanae, 113, 119, 392.
 — — hydrosus, 119, 392.
 Adnephryn, 393.
 Adhatoda, 119.
 — juice, 119.
 — liquid extract, 119.
 — tincture, 119.
 Adhesive plaster,
 628, 633.
 — preparations, 1373.
 Adiantum, 119.
 — capillas, 119.
 — pedatum, 119.
 — syrup, 1019.
 Adjuvant elixir, 543, 544.
 Adonidin, 120.
 — tannate, 120.
 Adonis æstivalis
 tincture, 1223.
 — vernalis, 119.
 Adonite, 120.
 Adrenal, 393.
 — gland, 120.
 Adrenalin, 393.
 — hydrochloride, 393.
 Adrenaline, 173.
 Adrenamine, 393.
 Adrin, 393.
 Adrue, 120.
 — fluidextract, 120.
 — rhizoma, 120.
 Aëration, 81.
 Æsco-quinine, 120.
 Æsculin, 120.
 Æsculus hippocast-
 anum, 120.
 — glabra, 120.
 — pavia, 120.
 Æther, 395.
 — aceticus, 396.
 — amyl-nitrosus, 397.
 — formicus, 397.
 — hydrochloricus, 399.
 Æther nitrosus, 398.
 Ætheres—Ethers, 394.
 Æteriske oljer, 833.
 Ætherolea, 833.
 Ætheroles, 398.
 Æthylis chloridum, 399.
 — carbamas, 399.
 African mahogany, 227.
 Agar-agar, 121.
 Agarase, 121.
 Agaracin, 121.
 Agaracine, 121.
 Agaric acid, 121.
 — surgeon's, 121.
 — white, 120.
 Agaricus albus, 120.
 — chirurgorum, 121.
 Agaroma, 121.
 Agate, 305.
 Agave, 121.
 Aginine, 393.
 Agitation, 82.
 Agrimonia, 121.
 Agrimony, 121.
 Aguacate, 204.
 Ague cures, 1139.
 — cure or syrup, 1139.
 — — tasteless, 1040.
 — mixture or chola-
 gogue, 1139.
 — pills, 1140.
 Ailanthus glandu-
 losa, 121.
 Air, gaseous, 246.
 — compressed, 246.
 — liquefied, 246.
 — the atmosphere, 246.
 — — weight of, 246, 247.
 — — chemical com-
 position of, 247.
 Airol, 259.
 Alantol, 182.
 Albolene, 726.
 Albumen, 113, 122.
 — dried, 122.
 — ovi, 122.
 — siccum, 122.
 Albumenoids, 122.
 Albuminates, 122.
 Alcho, 421.
 Alcohol, 401.
 — absolute, 406.
 — Br. P., 966.
 — allyl, 415.
 — amylic, 409.
 — amylicum, 409.
 — Atwood's patent, 408.
 — butylic, 479.
 — denaturized, 407.
 — deodoratum, 408.
 — deodorized, 408.

- Alcohol, diluted, 409.
 — dilutum, 409.
 — ethyl, 401.
 — Food and Drugs Law, 405.
 — industrial, 407.
 — in pharmacy, 405.
 — methylic, 410.
 — methylicum, 410.
 — perfumer's, 409.
 — percentage of, 403.
 — proof of, 402.
 — radicals, 400.
 — solid, 408.
 — stronger, 403.
 — wood, 410.
 — wood, Food and Drugs Act, 410.
 Alcoholates, 405.
 Alcohols—Alcohols, 400.
 Alcoholometer, — Gay-Lussac's, 72.
 — Tralles', 72.
 Alcohols, primary, 400.
 Alcool, 405.
 Alcoolats, 405.
 Alcoolatures, 1086.
 Aldehyde, 411.
 — acetic, 411.
 — ammonia, 411.
 — cinnamic, 509.
 Aldehydes, 411.
 — aromatic, 411.
 Alder, 123.
 Aletrin, 123.
 Aletris, 122.
 — cordial, 545, 1197.
 — elixir comp., 545.
 — fluidextract, 123.
 Alisma, 123.
 Alizarin, 214.
 Alkali, animal, 412.
 — vegetable, 412.
 — mineral, 412.
 Alkalies, 411.
 Alkaline earths, 412.
 — copaiba mixt., 1216.
 — elixir, 545, 617.
 — ointment, 1110.
 Alkaloids, 412.
 — and their salts, 414.
 — cinchona, 507.
 — cod liver oil, 826.
 — general formulas for, 413.
 Alkamides, 249.
 Alkanet root, 126.
 Alkanin, inspisated, 126.
 Alkanna root, 126.
 Allen's, Mrs. hair restorative, 1286.
 Allium, 123.
 Alligator pear, 204.
 — fluidextract, 204.
 Allotropic forms of phosphorus, 867.
 Allspice, 206.
 — essence, 1318.
 — wild, 189.
 Allyl, 415.
 — alcohol, 415.
 — hydrate, 415.
 — iodide, 415.
 — isothiocyanate, 415.
 — sulphide, 415.
 — sulphocarbamide, 415, 1031.
 — sulphocyanate, 415.
 — sulphocyanide, 843.
 — tribromide, 415.
 Almond, 125.
 — bitter, 125.
 — bitter spirit, 962.
 — blanched, 125.
 — cosmetic, 1284.
 — emulsion, 637.
 — essence, 1296.
 — hair lotion, 1280.
 — meal, 1311.
 — mixture, 812.
 — oil, 825.
 — — bitter, 834.
 — — — artificial, 462.
 — sweet, 125.
 — syrup, 986.
 — tooth cream, 1272.
 Almonds, powder compound, 904.
 — milk of, 1292.
 Alnuin, 123.
 Alnus, 123.
 — fluidextract, 123.
 Aloe, 415.
 — American, 121.
 — Barbadosis, 123, 416.
 — liquida, 416.
 — purificata, 416.
 — Socotrina, 123, 416.
 Aloes, 123, 415.
 — Barbados, 416.
 — Cape, 123, 416.
 — crocata tincture, 1036.
 — comp. decoction, 533.
 — extract, 649.
 — liquid, 416.
 — pills, 877.
 — and asafetida pills, 877.
 — and iron pills, 878.
 — and mastich pills, 878.
 Aloes and myrrh pills, 878.
 — purified, 416.
 — Socotrine, 123, 416.
 — suppository, 981.
 — tincture, 1035.
 — and myrrh tincture, 1036.
 Aloin, 124, 417.
 — elixir, 545.
 — and strychnine elixir, 546.
 — strychnine and belladonna elixir, 546.
 Aloinum, 417.
 Alopecia remedy, 1276.
 Alpha-eucaine, 645.
 — Pure Food and Drugs Act, 645.
 Alpha-naphthol salicylate, 417.
 Alphon, 417.
 Alphozone, 417.
 Alpine wormwood, 130.
 Alstonia, 124.
 — constricta, 124.
 — scholaris, 124.
 Alstonidine, 124.
 Alstonine, 123.
 Alterative comp., 1141.
 — elixir, 1203.
 — extract or juice, 1141.
 — syrup, 1020.
 Alteratives, 1041.
 — iodide, 1203.
 Althæa, 124.
 Alum, 417.
 — ammonia, 417.
 — ammonio-ferric, 669.
 — compound ointment, 1111.
 — curd, 418.
 — dried or burnt, 418.
 — glycerin, 729.
 — potassium, 417.
 — root, 179.
 — — fluidextract, 179.
 — whey, 418.
 Alumen, 417.
 — exsiccatum, 418.
 Alumina, 248, 421.
 Alumi et potassii sulphas, 417.
 — hydroxidum, 420.
 — sulphas, 421.
 Aluminum (element), 247.
 Aluminium, 247, 418.
 Aluminum, 247, 418.
 — acetotartrate, 421.
 — alloys, 247, 419.

- Aluminum beta-naphthol sulphonate, 421.
 — carbonate, 421.
 — caseinate, 421.
 — gallate, 421.
 — hydroxide, 420.
 — oxide, 421.
 — salts, general, 248.
 — sulphate, 421.
 — tannate, basic, 1026.
 Alumnol, 421.
 Alveloz, 166.
 — milk of, 166.
 Alynin, 422.
 Amalgam, ammonium, 249.
 — bismuth, 257.
 — gold, 274.
 — mercury, 288.
 Amalgamation, 81.
 Amandine, 1267.
 Amara, tincture, 1036.
 Amaranth, 1399.
 Amaryline, 1305.
 Amber, 226.
 — cement, 1376.
 — oil, 226, 843.
 Ambergris, 113, 124.
 — extract, 1296.
 — oil, 846.
 — tincture, 124.
 Ambra grisea, 124.
 Ambrosia, 124.
 — syrup, 1333.
 American aloe, 121.
 — centaury, 216.
 — — fluidextract, 216.
 — columbo, 169.
 — hellebore, 233.
 — ipecac, 172.
 — — fluidextract, 172.
 — ivy, 125.
 — saffron, 142.
 — sarsaparilla, 129.
 — wormseed oil, 837.
 Amethyst, 305.
 Amides, 249, 412.
 Amidogen, 249.
 Amines, 249, 412.
 Aminoform, 737.
 Aminol, 1383.
 Ammonia, 250, 422.
 — -alum, 417.
 — anisated spirit, 960.
 — aromatic spirit, 960.
 — etherate, 398.
 — fetid spirit, 961.
 — gas, 250, 422.
 — — liquefied, 250.
 — liniment, 767.
 — solution, 772.
 Ammonia solution, strong, 773.
 — spirit, 959.
 — water, 441, 772.
 — — stronger, 442, 773.
 Ammoniac-gum, 125.
 Ammoniacum, 125.
 — and mercury, plaster, 629.
 — mixture, 812.
 Ammoniated glycyrrhizin, 732.
 — mercury, 739.
 — — ointment, 1101.
 — opium liniment, 769.
 — phenylacetamide, 1143.
 — tincture ergot, 1053.
 — — guaiac, 1058.
 — — opium, 1069.
 — — quinine, 1074.
 — — valerian, 1082.
 Ammonii bromidum, 423.
 — benzoas, 422.
 — carbonas, 423.
 — chloridum, 424.
 — iodidum, 424.
 — nitras, 425.
 — phosphas, 425.
 — salicylas, 425.
 — sulphas, 426.
 — valeras, 426.
 Ammonio-ferric alum, 669.
 — — sulphate, 669.
 — — tartrate, 670.
 Ammonium, 249, 442.
 — amalgam, 249.
 — salts, general, 250.
 — acetate solution, 773.
 — benzoate, 422.
 — bromide, 423.
 — — elixir, 546.
 — carbonate, 423.
 — chloride, 424.
 — — elixir, 546.
 — — syrup, 1015.
 — — troches, 1090.
 — citrate solution, 773.
 — hydrate, 250, 422.
 — ichthyol sulphonate, 750.
 — iodide, 424.
 — — liniment, 1212.
 — nitrate, 425.
 — phosphate, 425.
 — salicylate, 425.
 — salts, 422.
 — sesquicarbonate, 423.
 — sulphate, 426.
 — valerate, 426.
 Ammonium valerate elixir, 547.
 — — — compound, 547.
 Ammonol, 1143.
 Amorphous carbon, 265.
 — phosphorus, 867.
 — sulphur, 314, 977.
 Ampelopsis, 125.
 — fluidextract, 125.
 Amygdala, 125.
 — amara, 125.
 — dulcis, 125.
 Amygdalol, 1300.
 — solution, 1303.
 Amygdophenin, 866.
 Amyl, 426.
 — acetate, 427.
 — alcohol, tertiary, 428.
 — butyrate, 427, 479.
 — chloride, 427.
 — formate, 427.
 — hydrate, 409.
 — hydrated oxide, 427.
 — iodide, 427.
 — nitrate, 427.
 — nitrite, 397, 427.
 — — pearls, 428.
 — — tubules, 428.
 — salicylate, 428.
 — valerate, 428.
 — valerianate, 427.
 Amylamine, 827.
 — hydrochlorate, 428.
 Amylenal, 428.
 Amylene, 428, 968.
 — hydrate, 428.
 — hydrochloride, 968.
 Amylic acid, 388.
 Amylis nitris, 427.
 Amylum, 125.
 Amyris linaloæ, 840.
 Anacardic acid, 126.
 Anacardium occidentale, 126.
 Anæsthetic, local, (teeth), 1248.
 Analgen, 499.
 Analgesic elixir, 548.
 — powder, 1143.
 Analgesics and antipyretics, 1042.
 Analgine, 1143.
 Anaphrodisiacs, 1148.
 Anatomical paste, 1378.
 Anchusæ radix, 126.
 Andrographis, 126.
 Anemonin, 210.
 Anemopsis, 127.
 Anesthesin, 428.
 — paraphenolsulphonate, 429.

- Anesthol, 429.
 Anethene, 835.
 Anethi fructus, 127.
 Anethol, 127, 835.
 Angelica, 127.
 — comp. spirit, 967.
 — extract, 1297.
 — — or essence, 1318.
 Angelicæ fructus, 127.
 — radix, 127.
 Angleworm oil, 829.
 Anguentum, 1102.
 Angustura bark, 157.
 — bitters, 1366.
 — — extract, 1366.
 Angosturine, 157.
 Anhydride, anti-
 — monic, 253.
 — arsenious, 457.
 — chromium, 506.
 — cyanogen, 363.
 — iodic, 759.
 — periodic, 277, 759.
 — tungstic, 320.
 Anhydrides, 295, 344.
 Anil, 429.
 Anilina, 429.
 Aniline, 429, 510, 866.
 — colors, permis-
 — sible, 1399, 1400.
 — black, 429.
 — blue, 429.
 — brown, 430.
 — gray, 429.
 — green, 430.
 — inks, 1387.
 — oil, 429, 510.
 — orange, 430.
 — purple, 430.
 — red, 430.
 — violet, 430.
 — — Hoffman's, 430.
 — yellow, 430.
 Animal alkali, 250, 412.
 — charcoal, 266, 491.
 — drugs, 112.
 — extracts, 114.
 — oil, Dippell's, 829.
 — products, 114.
 — soap, 929.
 Anisated spirit of
 — ammonia, 960.
 Anise, 127.
 — camphor, 835.
 — elixir, 548.
 — essence, 1316.
 — fruit, 127.
 — green, 127.
 — oil, 182, 835.
 — spirit, 962.
 — star, 127.
 Anise water, 443.
 Aniseed, 127.
 — cordial, 548.
 Anisette, 1369.
 — cordial, 1369.
 — essence, 1369.
 Anisi fructus, 127.
 — stellata fructus, 182.
 Anisic acid, 127.
 Anisum, 127.
 Annatto coloring, 519.
 Annottoine, 130, 519.
 Annidalin, 456.
 Anodyne ball, 1260.
 — balsam, 1153.
 — chlor- 1144.
 — cordial, Fos-
 — gate's, 1258.
 — elixir, 1144.
 — tincture, golden, 1144.
 — tooth-ache, 1247.
 Anodynes and
 — hypnotics, 1143.
 Antacedin, 264.
 Anthelmintic elixir, 612.
 Anthemidis flores, 127.
 Anti-asthmatic
 — elixir, 549.
 Anthemis, 127.
 — cotula, 127.
 Anti-dyspeptic
 — elixir, 626.
 Antidote, arsenic, 674.
 — antimony, 431.
 — barium, 256.
 — carbolic acid, 352.
 Antidotes for
 — morphine, 819.
 Anti-calor, 1143.
 Anti-epileptic mix-
 — ture, 1216.
 Antifebrin, 329.
 — elixir, 542.
 Anti-freckle
 — lotion, 1290.
 Antihydropin, 137.
 Antikamnia, 435.
 Antikol, 1143.
 Antimonial plaster, 633.
 — powder, 904.
 Antimoniates of pot-
 — assium, 298.
 Antimonic an-
 — hydride, 253.
 Antimonii et potassii
 — tartras, 431.
 — oxidum, 432.
 — sulphidum, 432.
 Antimonious acid, 253.
 — oxide, 432.
 — sulphide, 432.
 Antimonium, 430.
 — nigrum purifi-
 — catum, 432.
 — sulphuratum, 433.
 — tartaratum, 431.
 Antimony, 252, 430.
 — (element), 252.
 — alloys, 253.
 — and potassium
 — tartrate, 431.
 — antidote, 431.
 — black, 432.
 — butter of, 254.
 — chloride solution, 254.
 — chlorides, 253.
 — diaphoretic, 298.
 — oxide, 432.
 — regulus of, 431.
 — salts, general, 253.
 — sulphide or sul-
 — phuret, 432.
 — sulphide, purified, 432.
 — sulphurated, 433.
 — tartarated, 431.
 — trichloride, 253.
 — trioxide, 432.
 — trisulphide, 432.
 — wine, 1115.
 — vitrified, 254.
 Anti-moth paper, 1385.
 Antinervine, 435.
 Antineuralgic mixture,
 — Bert's, 1215.
 Antinosin, 435, 1029.
 Antiperiodic oint-
 — ment, 1110.
 Antiphlogistine, 1256.
 Antipyrina, 433.
 Antipyrine, 433, 864.
 — aceto-salicylate, 331.
 — amygdalate, 434.
 — benzoate, 434.
 — carbazotate, 435.
 — chloral, 434.
 — citrate, 434.
 — combinations, 434.
 — elixir, 549.
 — ferrated, 434.
 — iodide, 434.
 — picrate, 435.
 — salicylate, 435.
 — salol, 435.
 — tannate, 435.
 Anti-rheumatic
 — elixir, 626.
 Antisclerosin, 436.
 Antiseptin, 435.
 Antiseptic camphor
 — cream, 1314.
 — foot powder, 1195.
 — mouth wash, 1272.

- Antiseptic nebulizer liquid, 1217.
 — powder, 1046.
 — solution, 773, 1046.
 — styptic collodion, 516.
 — tooth powder, 1275.
 — vinegar, 336.
 Antiseptics, 1145.
 Antispasmin, 436.
 Antiseptol, 436.
 Antithermin, 436.
 Antitoxin, diphtheria, 931.
 Antitoxins, 436, 932.
 Antogoutteau de villette elixir, 626.
 Apallagin, 1029.
 Aperient, magnesium, 1147.
 — seltzer, 1147, 1234.
 Aperients, 1147.
 Aphrodisiacs, 1147.
 Apiin, 204.
 Apiol, 128, 204.
 — liquid, 128.
 — oleo-resin, 128.
 — pearls, 205.
 Apiole, 128.
 Apis, honey bee, 113.
 Apis mellifica, 146.
 Apium, 128.
 — graveolens, 128.
 — petroselinum, 128.
 Apocodeine, 854.
 — hydrochloride, 437.
 Apollinaris water, solution, 1345.
 Apocynin, 128.
 Apocynum, 128.
 — fluidextract, 686.
 Apomorphinæ hydrochloridum, 437.
 Apomorphine, 854.
 — hydrochloride, 437.
 — hypodermic injection, 755.
 Apothecaries' weight, 58, 61.
 — liquid measure, 59, 64.
 — — equivalents, 64.
 Apple, brandy, 210.
 — bark, 210.
 — cider, 1362.
 — fluidextract, 210.
 — jack, 210.
 — jelly, 210.
 — juice, 210.
 — sauce, 210.
 — syrup, 1333.
 — wine, 1362.
 Apple tree, 210.
 Apricot fruit syrup, 1331.
 — syrup, 1333.
 Aqua, 440.
 Aquæ—Waters, 438, 440.
 Aquæ medicatæ, 438.
 Aqua ammoniæ, 441, 772.
 — — fortior, 442, 773.
 — amygdalæ amaræ, 443.
 — anethi, 443.
 — anisi, 443.
 — aurantii floris, 444.
 — aurantii florum, 443.
 — — fortior, 444.
 — calcariae, 444.
 — calcis, 444.
 — camphoræ, 444.
 — carui, 445.
 — chloroformi, 445.
 — cinnamomi, 446.
 — creosoti, 446.
 — destillata, 441.
 — fœniculi, 447.
 — fortis, 369.
 — hamamelidis, 447.
 — hydrogenii dioxidii, 447.
 — laurocerasi, 448.
 — menthæ piperitæ, 449.
 — menthæ viridis, 450.
 — phagendica, 801.
 — pimentæ, 450.
 — regia, 294.
 — rosæ, 450.
 — — fortior, 451.
 — sambuci, 451.
 Aquarium cement, 1376.
 Arabic acid, 117.
 Arabin, 117.
 — sugar, 118.
 Arabinose, 118.
 Aralia, 128.
 — canadensis, 128.
 — hispida, 128.
 — nudicaulis, 129.
 — racemosa, 129.
 — spinosa, 129.
 — syrup comp., 1020.
 Araroba, 129, 149.
 Arbor vitæ, 229.
 — fluidextract, 229.
 Arbutin, 148, 232.
 Arbutus, trailing, 163.
 Areca catchu, 129.
 — nut, 129.
 — fluidextract, 129.
 Arecine, 129.
 Arecoline, 129.
 — hydrobromide, 129.
 Arecoline eserene, 129.
 Aristochin, 456.
 Aristol, 456.
 Aristoquin, 456.
 Argenol, 455.
 Argentamine, 306, 455.
 Argenti cyanidum, 452.
 — nitras, 452.
 — — fusus, 453.
 — — mitigatus, 453.
 — — oxidum, 454.
 Argentol, 455.
 Argentose, 455.
 Argentum—Silver, 305, 451.
 — (element), 305.
 Argentum Credé, 455.
 — purificatum, 452.
 Argon, 254.
 Argonin, 306, 455.
 Argyrine, 120.
 Argyrol, 455.
 Armoraciæ radix, 129.
 Arnotta, 130.
 Arnatto, 519.
 Arnica, 129.
 — (flowers) tinct., 1036.
 — fluidextract, 130.
 — glycerite, 732.
 — jelly, 1289.
 — liniment, 1208.
 — rhizome, 129.
 — (root) extract, 650.
 — — tincture, 1037.
 — salve, carbolated, 1226.
 — tooth wash, 1272.
 Arnicated oil, 1223.
 Arnicine, 130.
 Aromatic bitters, 1336.
 — — extract, 1366.
 — cachous, 1366.
 — elixir, 549, 550.
 — — glycyrrhiza, 601.
 — extract Jamaica ginger, 1192.
 — fluidextract, 687.
 — ointment, 1110.
 — powder, 905.
 — — of chalk, 905.
 — — and opium, 905.
 — series, 461.
 — solution of pepsin, 609.
 — spirit of ammonia, 960.
 — sulphuric acid, 381.
 — syrup, 986.
 — — blackberry, 1020.
 — — cascara, 988.

- Aromatic syrup
 rhubarb, 997.
 — — of terebene, 1019.
 — — yerba santa
 compound, 1023.
 — tincture, 1037.
 — — rhubarb, 1075.
 — — yerba santa, 1084.
 — vinegar, 337, 1313.
 — waters, 438.
 — wine, 1115, 1121.
 Arrack, imitation, 1358.
 Arrow poison, S. A.
 Indian, 157.
 Arrowroot, 126.
 Arsenates, 255.
 Arsenauo, 457.
 Arsen-ferratin, 457.
 Arsenhemol, 736.
 Arsenic, 254, 347, 456.
 — (element), 254.
 — acid, 347.
 — antidote, 457, 674.
 — compounds, gen-
 eral, 255.
 — elixir, 550.
 — — compound, 551.
 — hydrochloric sol-
 ution, 772.
 — iodide, 456.
 — trioxide, 457.
 — white, 347.
 Arsenical solution, 774.
 Arseni iodidum, 456.
 — trioxidum, 347, 457.
 Arsenicum, 456.
 Arsenii iodidum, 456.
 Arsenious acid, 347.
 — iodide, 456.
 Arsenites, 255.
 Arsenous acid
 solution, 772.
 — and mercuric io-
 dides solution, 774.
 Arsen-protylin, 457.
 Arsylin, 457.
 Artemisia, 130.
 — abrotanum, 130.
 — absinthium, 116.
 — comp. syrup, 1020.
 — dracunculus, 130.
 — frigida, 130.
 — Mexicana, 130.
 — pontica, 116.
 — rupestris, 130.
 — vulgaris, 130.
 Arthanic acid, 194.
 Artificial brandy, 1356.
 — butter, 480.
 — Carlsbad salts, 1234.
 — gum, 534.
 Artificial musk, 1300.
 — — solution, 1303.
 — — oil of garlic, 415.
 — — mustard, 415.
 — — wintergreen, 811.
 — rum, 1358.
 — whisky, 1359.
 — wines, 1362.
 Arum, 130.
 — maculatum, 130.
 — triphyllum, 130.
 Arzneisächchen, 496.
 Asafetida, 131.
 Asafetida, 131.
 — emulsion, 637.
 — pills, 878.
 — pill comp., 882.
 — and magnesia
 mixture, 815.
 — tincture, 1037.
 Asarum, 131.
 — canadense, 131.
 — comp. syrup, 1020.
 Asclepias, 131.
 — curassavica, 131.
 — incarnata, 131.
 — syriaca, 131.
 — tuberosa, 131.
 Asclepin, 131.
 Asclepidin, 921.
 Aseptol, 379.
 — tooth-ache
 remedy, 1247.
 Ash, black, 169.
 — American, 169.
 — European, 169.
 — fluidextract, 169.
 — prickly, 235.
 — soda, 412.
 Asiatic tincture for
 cholera, 1171.
 Asimina, 131.
 Asparagin, 132.
 — fluidextract, 132.
 Asparagus, 132.
 Asparol, 132.
 Aspidium, 132.
 — filix mas, 168.
 — oleo-resin, 849.
 Aspidosperma, 132.
 — fluidextract, 132.
 Aspidospermene, 132.
 Aspirin, 342, 458.
 Asseline, 827.
 Asthma inhalant, 1150.
 — cure, 1149.
 — mixture,
 Fothergill's, 1216.
 — nebulizer liquid, 1218.
 — pastilles, 1150.
 — relief, 1149.
 Asthma remedy, 1149.
 — remedies, 1148.
 — vaporizing rem-
 edy, 1150.
 Asthmatic cigar-
 ettes, 1150.
 Astringent ball, 1260.
 — eye salve, 1195.
 — ointment, 1110.
 Atherische Ole, 833.
 Atomic weight, 238.
 — weights, table of, 239.
 Atoms, (chemical), 238.
 Atropia, 458.
 Atropina, 458.
 Atropinæ sulphas, 458.
 Atropine, 135, 458.
 — discs of, 766.
 — elixir, 551.
 — methylbromide, 459.
 — ointment, 1096.
 — oleate, 847.
 — sulphate, 458.
 — — solution, 775.
 Augai siensis, 134.
 Aurantii amari
 cortex, 132.
 — cortex siccatus, 132.
 — dulcis cortex, 132.
 Aurates, 274.
 Auri et sodii
 chloridum, 460.
 Auric chloride, 274.
 — acid, 274.
 — oxide, 274.
 Aurin or auromine, 429.
 Aurous chloride, 274.
 — oxide, 274.
 Aurum — Gold, 460.
 Australian cholera
 specific, 1171.
 — fever bark, 124.
 — kino, 165.
 Ava kava, 195.
 Avena, 133.
 — concentrated
 tincture, 133.
 — farina, 133.
 — sativa tincture, 1258.
 Avenine, 133.
 Avenase, 133.
 Avens, European, 172.
 — water, 172.
 Avocado pear, 204.
 Avoirdupois
 weight, 58, 62.
 — equivalents, 62.
 Azadirachta Indica, 133.
 Azotates, 460.
 Azote, 283, 460, 823.
 Azotites, 460.

Azotum, 460.

B

Babbitt-metal, 253.
 Babul bark, 118.
 Baby cough syrup, 1176.
 Baby-soother, 1238.
 Baccæ, 133.
 Bael fruit, 135.
 Baking powders, 1379.
 — soda, 935.
 Balance, hydrostatic, 72.
 Baldness, cure for, 1276.
 — remedies for, 1276.
 Ball, anodyne, 1260.
 — astringent, 1260.
 — cough, 1260.
 — diuretic, 1260.
 — physic, 1260.
 Balls or masses, 1260.
 — condition, 1260.
 — worm, 1260.
 Balm, 194.
 — Bernhardt's, 1268.
 — comp. spirit of, 967.
 — eucalyptus, 1151.
 — fluidextract, 194.
 — of Gilead, 134, 208.
 — — ointment, 209.
 — tree, 114.
 — magic, 1151.
 — magnetic, 1151.
 — pain cure, 1152.
 — ready, 1152.
 — wizard, 1152.
 Balmony, 147.
 — fluidextract, 148.
 Balms or panaceas, 1150.
 Balsam anodyne, 1153.
 — Calaba, 133.
 — Canada,
 115, 134, 228, 1028.
 — canker, 1153.
 — carpathina, 135.
 — caustic, 1152.
 — copaiba, 134, 154.
 — cough, 1176.
 — fir, 115, 228, 1028.
 — Friar's, 1040.
 — green, 134.
 — Gombault's, 1153.
 — gurjun, 134, 852.
 — hair, 1284.
 — Hungarian, 134, 852.
 — Japan varnish, 134.
 — Locatelle's, 1153.
 — lung, 1180.
 — mecca, 134.
 — Oregon fir, 115.
 — Peckham's, 1154.
 — Peru, 134.

Balsam pine, 115.
 — Rackasiri, 135.
 — Riga, 135.
 — Thibault's, 1154.
 — tolu, 134.
 — — syrup, 1003.
 — — tincture, 1081.
 — Turlington's, 1154.
 — turpentine, 135.
 — vegetable heal-
 ing, 1154.
 — Venice turpen-
 tine, 135.
 Balsama, 133.
 Balsamic tooth
 wash, 1272.
 — tincture, 1039.
 Balsams, 110, 133.
 — proprietary, 1152.
 — true, natural, 133.
 — veterinary, 1260.
 Bamboo brier root, 224.
 — fluidextract, 224.
 Banana syrup, 1334.
 — oil, 427.
 Bandoline, 1265.
 — rose, 1265.
 Baneberry, 119.
 Baptisia, 135.
 Baptisin, 135.
 Barbados aloes, 416.
 — tar, 846.
 Barber's itch
 — ointment, 1227.
 — pomade, 1283.
 — shampoo, 1286.
 Barberry, 136.
 — fluidextract, 136.
 Barii dioxidum, 461.
 Barium, 255, 460.
 — (element), 255.
 — antidotes for, 256.
 — dioxide, 461.
 — peroxide, 461.
 — salts of, general, 255.
 Bark, acacia, 118.
 — babul, 118.
 — Peruvian, 149.
 — sacred, 143.
 Barkeeper's friend, 1396.
 Barks, 110.
 Barosmin, 137.
 Barometer, aneroid, 246.
 — cistern, 246.
 — siphon, 246.
 Barometers, early
 history of, 246.
 Barometry, 246.
 Baryta, 460.
 — water, 256.
 Baryte, 256.

Base hair oil, 1281.
 Bases, synthetic
 perfumes, 1303.
 Basilicon ointment,
 495, 1097, 1107.
 Basis, troches, 1088.
 Bassorin, 230.
 Baswood, 229.
 Baumé's hydro-
 meter, 71, 74.
 Baume vert, 133.
 Bayberry, 197.
 — fluidextract, 197.
 — oil, 830.
 — tallow, 146.
 Bay cosmetic, 1284.
 — essence, 1316.
 — hair grower, 1280.
 — — lotion, 1281.
 — leaves, 197.
 — oil, 197, 841.
 — rum,
 197, 841, 966, 1281.
 Bdellium, 135.
 Bean, Calabar, 205, 869.
 — Calabar tincture, 1071.
 — ordeal, 205.
 — pichurum, 206.
 — St. Ignatius, 181.
 Beans, 110.
 Bearberry leaves, 232.
 — fluidextract, 232.
 — infusion, 754.
 Bearsfoot, 208.
 — fluidextract, 208.
 Bear's grease, 829.
 — oil, 829.
 Beauxite, 247.
 Bebeeru cortex, 135.
 — bark, 135.
 — fluidextract, 135.
 Beberine, 461.
 — sulphate, 461.
 Beberinum, 461.
 Bed-bug poison, 1385.
 — exterminator, 1385.
 Bedstraw, 170.
 Beecham's pills, 1258.
 Beech drops, 163.
 — fluidextract, 163.
 Beech-nut oil, 830.
 Beef and coca
 elixir, 1241.
 — — tonic, 1241.
 — and iron, wine, 1121.
 — — elixir, 551.
 — extract, 1319.
 — iron and cin-
 chona elixir, 552.
 — — cinchona
 wine, 1122.

- Beef juice, 1319.
 — tea extract, 1344.
 — wine of, 1121.
 Beer extracts, 1324.
 — syrups, 1334.
 Beeswax, 146.
 — bleached, 146.
 — purifying, 1400.
 — white, 146, 493.
 — yellow, 146, 493.
 Belæ fructus, 135.
 Belladonna, 135.
 — dialysate, 536.
 — elixir, 552.
 — extract, 650.
 — — alcoholic, 651.
 — — green, 651.
 — folia, 135, 461.
 — fluidextract, 135.
 — leaves, 461.
 — liniment, 764.
 — oil, 846.
 — ointment, 1097.
 — plaster, 629.
 — root, 462.
 — — fluidextract, 687.
 — suppositories, 981.
 — tincture,
 (leaves), 1039.
 — — root, 1039.
 — vinegar, 339.
 Belladonnæ radix,
 135, 462.
 Bell metal, 271.
 Benedictine, 1369.
 Benjamin, (benzoin); 134.
 Benné, 223.
 — oil, 223, 828.
 Benzaldehyde,
 462, 464, 1300.
 Benzaldehydum, 462.
 Benzene, 463, 510.
 — series, 464.
 Benzin, 463, 863.
 — jelly, 1380.
 — petroleum, 463.
 — — purified, 466.
 Benzine, 463, 863.
 Benzinum, 463.
 — purificatum, 466.
 Benzoated lard, 391.
 Benzoates, 349.
 Benzoic acid, 134, 348.
 — — lozenge, 1089.
 — ether, 644.
 Benzoin, 134, 136.
 — flowers of, 348.
 — oil, 846.
 — ointment, 1097.
 — tincture, 1040.
 — tincture, comp., 1040.
 Benzoinated lard,
 391, 1097.
 — petrolatum, 1097.
 Benzoinum, 134, 136.
 Benzol, 463, 510.
 Benzo-naphthol, 465.
 — -phenoneid, 465.
 Benzosol, 465.
 Benzosulphinide,
 466, 723.
 Benzosulphinidum,
 465, 466, 723, 924.
 Benzoyl, 134, 464.
 Benzoyl-acetyl per-
 oxide, 331.
 — anilid, 464.
 — ecgonine, 464.
 — eugenol, 465.
 — guaiacol, 465.
 — naphthol, 465.
 — peroxide, 465.
 — phenetidine, 465.
 — pseudotropine, 1093.
 — sulphonic imide, 465.
 — tropine, 466.
 Benzozone, 331.
 Benzyl bezoate, 134.
 — cinnamate, 134.
 Berberina, 467.
 Berberinæ hydro-
 chloras, 467.
 — sulphas, 467.
 Berberine, 136, 467.
 — carbonate, 468.
 — elixir, 552.
 — elixirs, comp., 553.
 — hydrochloride, 467.
 — phosphate, 468.
 — sulphate, 467.
 Berberis, 136.
 — aquifolium, 136.
 — fluidextract, 687.
 — vulgaris, 136.
 Bergamot essence, 1296.
 — oil, 834.
 Bernhardt's balm, 1268.
 Berries, 111, 133.
 Bert's antineuralgic
 mixture, 1215.
 Beryl, 257.
 Beryllium, 257.
 — (element), 257.
 — salts of, 257.
 Beta-eucaine, 645.
 — Pure Food and
 Drugs Act, 645.
 Betanaphthol, 468, 822.
 — benzoate, 465, 469.
 — bismuth, 469.
 — salicylate, 468, 469.
 Betel nut, 129.
 Beth root, 230.
 — — fluidextract, 230.
 Betol, 468.
 — ointment, 469.
 Betonica, 136.
 Betula oil, 836.
 Biborate of sodium, 475.
 Bidens bipinnata, 136.
 Bindweed, tropical, 179.
 Biologicals, 932.
 Birch beer extract, 1224.
 — — syrup, 1334.
 — oil, empyreu-
 matic, 842.
 — tar oil, 842.
 Bird glue, 205.
 — lime, 205.
 Birth root, 230.
 — fluidextract, 230.
 Bisformasal, 259.
 Bismal, 259.
 Bismon, 474.
 Bismuth, 257, 469.
 — (element), 257.
 — alloys, 257.
 — amalgam, 257.
 — agaricinate, 473.
 — and ammonium
 citrate, 471.
 — and ammonium cit-
 rate solution, 946.
 — anhydride, 471.
 — benzoate, basic, 474.
 — citrate, 470.
 — comp. lozenge, 1090.
 — — mixture, 813.
 — elixirs, comp., 553.
 — glycerite, 732.
 — hair dye, 1297.
 — (metal), 470.
 — oxide, 471.
 — — colloid, 474.
 — — hydrated, 471.
 — oxycarbonate, 470.
 — proteinate, 474.
 — pyrogallate, 474.
 — resorcinat, 474.
 — salicylate, 473.
 — oxynitrate, 472.
 — salts of, general, 258.
 — subbenzoate, 474.
 — subcarbonate, 472.
 — subnitrate, 472.
 — subsalicylate, 473.
 Bismuthi carbonas, 470.
 — citras, 470.
 — et ammonii
 citras, 471.
 — oxidum, 471.
 — salicylas, 473.
 — solution, conc., 947.

- Bismuthi
 subcarbonas, 472.
 — subgallas, 472.
 — subsalicylas, 473.
 — subnitrates, 472.
 Bismuthic acid, 471.
 Bismuthose, 474.
 Bismutum, 469.
 Bisol, 259.
 Bistort, 136.
 Bitartrates, 387.
 Bitter almond oil, 834.
 — — spirit, 962.
 — — water, 443.
 — bark, 124.
 — curaçoa, 1371.
 — elixir, 546, 553.
 — orange peel, 132.
 — — peel tincture, 1038.
 — — fluidextract, 687.
 — tea, 956.
 — tincture, 1036.
 Bittern, 476.
 Bitters,
 — angostura, 1366.
 — — extract, 1366.
 — aromatic, 1366.
 — — extract, 1366.
 — blood, 158.
 — extract,
 Bowker's, 1366.
 — burdock, 1158.
 — cinchona, 1367.
 — extracts, 1366.
 — German liver, 1159.
 — hop, 1156.
 — in powder, 1161.
 — iron, 1157.
 — iron and wine, 1158.
 — jaundice or lax-
 ative, 1160.
 — mandrake, 1161.
 — orange, 1367.
 — — extract, 1367.
 — Peruvian, 1367.
 — — extract, 1367.
 — plantation, 1157.
 — poor man's, 1160.
 — proprietary, 1155.
 — rheumatic pow-
 der, 1233.
 — stomach, 1156, 1367.
 — — extract, 1367.
 — Stoughton, 1367.
 — wild cherry, 1367.
 — — extract, 1367.
 — wahoo, 1156.
 Bittersweet, 161.
 — fluidextract, 161.
 — oil, 846.
 Bittersweet, false,
 fluidextract, 145.
 — ointment, 145.
 Black alder, 209.
 fluidextract, 209.
 — aniline, 429.
 — — ink, 1387.
 — antimony, 432.
 — chewing gums, 1354.
 — cohosh, 149.
 — — elixirs, 554.
 — — extract, 652.
 — — tincture, 1047.
 — draught, 753, 816.
 — drop, British, 340.
 — fly preventive, 1386.
 — hair dye, 1278.
 — haw, 234.
 — — fluidextract,
 haw elixir, 555, 623.
 ink powder, 1391.
 Sampson, 161, 215.
 — fluidextract,
 161, 215.
 — shot, 1215.
 — snakeroot, 149.
 — sulphur, 314.
 — wash, 801.
 Blackberry, 214.
 — brandy essence, 1364.
 — carminative, 1162.
 — cordial, 1184.
 — elixir, 554.
 — fluidextract, 704.
 — fruit juice, 1330.
 — root, 214.
 — syrup, 998, 1334.
 — — aromatic, 1020.
 — — concentrated, 1330.
 — wine, 1365.
 — — essence, 1364.
 Blackboard slating, 1392.
 Blackings, 1393.
 — shoe, 1393.
 Bladder-wrack, 170.
 fluidextract, 170.
 Blancard's pills, 881.
 Blatta orientalis, 137.
 Blaud's pills, 880.
 Blazing star, 178.
 Bleach, imperial,
 face, 1266.
 — peerless, face, 1267.
 Bleaching sponges, 1400.
 — powder, 488.
 Bleisalbe, 1106.
 Blessed thistle, 145.
 — fluidextract, 145.
 Blistering cerate, 495.
 liquid, 338, 778.
 plaster, 495.
 Blisters, veter-
 inary, 1261.
 Blood bitters, 1158.
 — dragon's, 218.
 — flower, 131.
 — purifiers, pro-
 prietary, 1161.
 — purifying tea, 1162.
 Bloodroot, 217.
 — fluidextract, 217, 704.
 — tincture, 1076.
 — vinegar, 341.
 Bloom of Ninon face
 powder, 1271.
 — roses, 1267.
 Blondine, 748, 1279.
 Blue aniline, 429.
 — cohosh, 145.
 — flag, 183.
 — — extract, 183.
 — — fluidextract, 183.
 — ink, 1388.
 — — powder, 1391.
 — litmus, 519.
 — mass, 809.
 — methylene, 812.
 — ointment, 1102.
 — pill, 809, 882.
 — Prussian, 299.
 — stone, 272, 530.
 — vitriol, 272, 530.
 Blueberry root, 145.
 Bluings, 1393.
 Bogbean, 195.
 Boiling points of ele-
 ments, 245.
 — — some com-
 pounds, 245.
 Boldine, 137.
 Boldo, 137.
 — fluidextract, 137.
 — glucin, 137.
 Bone, cuttlefish, 201.
 — black, 265, 491.
 — oil, 266, 491.
 — spirit, 266, 491.
 Boneset, 166.
 — fluidextract, 166, 693.
 Bonjean's ergotine, 164.
 Boracic acid, 349, 474.
 Borage, 137.
 Borago, 137.
 Borates, 260, 350.
 Borax, 175, 308, 935.
 — glycerin, 730.
 — honey, 810.
 Boric acid, 260, 349, 474.
 — — glycerin, 728.
 — — ointment, 1095.
 Boroglyceride, 476.
 — solution, 729.

- Boroglycerin glycerite, 729.
 Boron, 260, 474.
 — (element), 260.
 Boquet essence, 1298.
 Botanical signs, 21.
 Botany, 107.
 — artificial system, 108.
 — classification in, 107.
 — early history of, 107.
 — natural system, 108.
 — nomenclature, 109.
 Bougies, 496, 497.
 Bouillon, clam, 1344.
 — cubes, 1344.
 — tomato, 1344.
 Bourbon whisky essence, 1359.
 Box, 138.
 — oil, 138.
 Bradycrotine, 1256.
 Brandy, 967.
 — artificial, 1356.
 — essence, 1356.
 — mixture, 816.
 — syrup, 1334.
 Brass, 270.
 Brayera, 158.
 Brazil-nut oil, 830.
 — wood, 219.
 Brechweinstein-salbe, 1108.
 Brilliantines, 1266.
 Brimstone, 314.
 Britannia-metal, 253.
 British
 black drop, 340.
 gum, 534.
 oil, 846.
 Bromacetic acid, 478.
 Bromacetanilid-mono or para, 435.
 Brom-acetan-caffeine elixir, 555.
 — acetanilide caffeine effervescent, 1188.
 — iodide of calcium comp. elixir, 555.
 Bromal, 411, 477.
 — hydrate, 477.
 Bromalin, 477.
 Bromamide, 477.
 Bromates, 359, 477.
 Bromatone, 477.
 Bromic acid, 359, 477.
 Bromide-chloral elixir, 613.
 — of iron syrup, 1005.
 — morphine syrup, 1005.
 — quinine syrup, 1006.
 — sodium syrup, 1006.
 Bromide-chloral strychnine syrup, 1006.
 — syrup comp., 1006.
 Bromidia, 1221.
 Bromine, 261, 476.
 — (element), 261.
 — combinations, 261.
 — iodide, 478.
 Bromides, 476.
 — compound, 1222.
 — — elixir, 555.
 — Peacock's, 1222.
 Bromo-caffeine elixir, 556.
 — chloral liquor comp., 1221.
 — — solution comp., 1221.
 — chloralum solution, 1388.
 — seltzer efferv., 1189.
 Bromoform, 476.
 Bromohemol, 736.
 Bromol, 477.
 Bromoformum, 476.
 Bromocoll, 477.
 Bromopin, 478.
 — solid, saccharated, 478.
 Bromosin, 478.
 Bromum, 476.
 Bronze, 271.
 — casting, 271.
 — phosphor, 271.
 — gold, 271.
 — silicon, 270.
 Broom, 221.
 — tops, 221.
 — — fluidextract, 221.
 — infusion, 754.
 Brown aniline, 430.
 — hair dye, 1278.
 — mixture, 814.
 — — improved, 814.
 — -Séguard's anti-epileptic mixture, 1216.
 Brucine, 199, 478, 971.
 — phosphate, 478.
 — sulphate, 478.
 Brucinum, 478.
 Brust-thee, 1182.
 Bryonia, 137.
 — fluidextract, 137.
 Bryonin, 137.
 Buchu, 137.
 — compound, 1206.
 — elixir, 556.
 — elixirs, comp., 557.
 — fluidextract, 137, 688.
 — folia, 137.
 — infusion, 753.
 Buchu leaves, 137.
 — tincture, 1041.
 Buckbean, 195.
 — fluidextract, 195.
 Buckeye, Ohio, 120.
 — red, 120.
 Buckhorn brake, 201.
 — fluidextract, 201.
 Buckthorn bark, 169, 212.
 — berries, 169, 212.
 — fluidextract, 169, 212, 693.
 — juice, 212.
 — syrup, 212.
 Buds, cassia, 150.
 — Balm Gilead, 208.
 — — fluidextract, 209.
 Bottled electricity, 1202.
 Bug and ant poison, 1385.
 — and cockroach destroyer, 1385.
 Bugle weed, 191.
 — — fluidextract, 191.
 Bulbi, 137.
 Bulbs, 137.
 Bulbus alii, 137.
 — cepæ, 138.
 — colchici, 138.
 — lilii, 138.
 — scillæ, 138.
 Burdock, 187.
 — fluidextract, 187, 697.
 — oil, 830.
 Burgundy pitch, 115, 886.
 Burning bush, 165.
 Burnt alum, 418.
 — sugar coloring, 517.
 Butea, 138.
 — frondosa, 138.
 — gum, 138.
 Butter, artificial, 480.
 — cacao, 828.
 — of cacao, suppositories, 981.
 — color, 519.
 — skotch, 1349.
 Butterine, 480.
 — Pure Food Laws, 480.
 Butterfly-weed, 131.
 Butternut, 184.
 — bark, 185.
 — fluidextract, 185.
 — oil, 185.
 Button bush, 145.
 — — fluidextract, 145.
 — snakeroot, 164.
 — — fluidextract, 164.
 Butyl-chloral, 41, 479.
 — — hydrate, 479.

Butyl-chloral
or tetryl, 478.
Butyrates, 479.
— ether, 479.
Butylic alcohol, 479.
Butyrate of amyl, 479.
— of ethyl, 479.
Butyric ether, 644.
— acid, 479.
Butyrim, 479.
Butyrum, 479.
Buxus, 138.

C

Cacao, 228, 505.
— butter, 229, 828.
— seeds, 228.
— suppositories, 981.
Cachets, 480.
Cacodylate strychnine, 972.
Cacodylic acid, 350.
Cactus grandiflora, 138.
Cade oil, 836.
Cad-formol, 262.
— — ointment, 262.
Cadmium, 261.
— element), 261.
— salts, 261.
Cæsium (element), 262.
Caffea, 138.
Caffeina, 481.
— citrata, 481.
Caffeina citrata
effervescens, 481.
— citras, 481.
Caffeine, 139, 481.
— and sodium benzoate, 483.
— — salicylate, 483.
— benzoate, 482.
— brom-acetanilide, 1188.
— citrate, 481.
— — elixir, 576.
— citrated
effervescent, 1189.
— elixir, 558.
— hydrobromide, 482.
— — efferv., 1189.
— hydrochloride, 482.
— salicylate, 483.
— sulphate, 483.
— valerate, 483.
Caffeotanilid, 1143.
Cajuput oil, 836.
— spirit, 963.
— tooth-ache remedy, 1247.
Calabar bean, 205, 869.
— — extract, 205, 661.

Calabar bean
fluidextract, 205, 661.
— — tincture, 1071.
Calamine, 139.
Calamus, 139.
— essence, 1316.
— fluidextract, 139, 688.
— oil, 139.
— syrup, 1334.
— tincture, 1041.
Calcedony, 305.
Calcii bromidum, 483.
— carbonas,
præcipitatus, 484.
— chloridum, 485.
— hydras, 485.
— hypophosphis, 486.
— phosphas, 486.
— — præcipitatus, 486.
— sulphas
exsiccat, 487.
Calcination, 92.
Calcined magnesia, 804.
— — heavy, 803.
— — light, 803.
— plaster, 264.
Calcium, 262, 483.
— (element), 262.
— compounds, 263.
— salts, general, 263.
— bromide, 483.
— carbonate precipitated, 484.
— carbonate, prep., 484.
— comp. syrups, 1009.
— elixirs, 558.
— glycerinophosphate, 727.
— hydroxide, 485.
— — solution, 775.
— hydroxide, syrup, 987.
— hypophosphite, 486.
— — syrup, 1008.
— iodide syrup, 1011.
— iodo-bromide comp., 1204.
— lactophosphate solution, 947.
— — syrup, 987, 1014.
— — and pepsin syrup, 1014.
— oxide, 487.
— — chlorinated, 487.
— phosphate, 486.
— — precipitated, 486.
— — solution, 947.
— — syrup, 1015.
— sulphate, exsiccated, 487.
Calendula, 139.

Calendula
fluidextract, 139.
— glycerite, 732.
— tincture, 1041.
California fever
bush, 171.
— fluidextract, 171.
— fig laxative, 1168.
— poppy, 165.
— fluidextract, 165.
Calisaya, 139.
— china, 139.
— cordial, 524.
— elixirs, comp., 559 to 569.
— essence, 642.
— iron and strychnine wine, 1122.
— or cinchona elixir, 560.
— phosphate syrup, 1334.
— syrup, 1334.
— wine, 1123.
Calmant elixir, 626.
Calomel, 741.
— compound pill, 882.
— ointment, 1104.
Calorie, 78.
Calorimeters, 79.
Calorimetry, 79.
Calumba, 139.
— conc. solution, 777.
— elixir, 576.
— fluidextract, 688.
— radix, 139.
— root, 139.
— tincture, 1042.
Calx, 487.
— chlorinata, 487.
— sulphurata, 488.
Cambogia, 140.
Campho salicyl, 1257.
— phenique, 1257.
Camphor, 140, 488.
— crude, 140.
— refined, 140.
— artificial, 140.
— cerate, 494.
— chloral, 501.
— — tooth-ache cure, 1247.
— cream, antiseptic, 1314.
— etherate, 398.
— ice, 1225.
— — with glycerin, 1288.
— liniment, 768.
— — ammoniated, 768.
— — comp., 768.
— mixture, Hope's, 1216.
— monobromated, 489.

- Camphor monobromated elixir, 569.
 — peppermint, 840.
 — plaster, 633.
 — salol, 926.
 — spirit, 963.
 — tincture comp., 1042.
 — water, 444.
 Camphora, 140, 488.
 Camphora monobromata, 489.
 Camphorated glycerin honey, 1289.
 — cream salve, 1165.
 — oil, 768.
 — tinc. of opium, 1069.
 — tooth powder, 1275.
 — vinegar, 337.
 Camphoric acid, 140, 350.
 Camphoronic acid, 140.
 Canada balsam, 115, 228, 1028.
 — pitch, 887.
 — snakeroot, 131.
 — turpentine, 115, 134, 228, 851, 1028.
 Canadian hemp, 128.
 — fluidextract, 128.
 Cancer plaster, 634.
 Candle-nut oil, 830.
 Candies and Confectionery, 1348.
 Candy, French, 1350.
 — hickory nut, 1351.
 — maple cream, 1351.
 — molasses, 1352.
 — taffy, 1352.
 Cane sugar, 923.
 Canella, 140.
 — alba, 140.
 — cortex, 140.
 — bark, 140.
 — fluidextract, 140.
 Canker balsam, 1153.
 Cannabin, 141.
 Cannabine, 141.
 — tannate, 141.
 Cannabis Indian, 141.
 — fluidextract, 141.
 — indica extract, 651.
 — sativa, 141.
 Cantharides, 113.
 — ointment, 1098.
 — — veterinary, 1098.
 — liniment, 768.
 — plaster, 630.
 — tincture, 1043.
 — vinegar, 338.
 Cantharadin, 141.
 Cantharidine, 141.
 Cantharis, 141.
 — vesicatoria, 141.
 Caoutchouc, 141, 162.
 Capparis Coriaceæ tincture, 1079.
 Capsella bursa pastoris, 141.
 Capsici fructus, 142.
 Capsicum, 142.
 — fastigiatum, 142.
 — fluidextract, 142, 688.
 — minimum, 142.
 — ointment, 1098.
 — oleoresin, 142, 850.
 — plaster, 630.
 — tincture, 1044.
 Capsules, 111, 489.
 — hard, 490.
 — poppy, 202.
 — soft or elastic, 490.
 Caramel, 517.
 Caramels, coconut, 1349.
 — vanilla, 1349.
 Caraway, 143.
 — fruit, 143.
 — fluidextract, 143.
 — essence, 1316.
 — oil, 133, 836.
 — water, 445.
 Carbazotates, 376.
 Carbazotic acid, 376.
 Carbide, 266.
 Carbides, 266.
 Carbinol, 410, 811.
 — dimethyl, 428.
 Carbo — Carbon, 490.
 — ligni, 491.
 Carbolate of iodine inhalant, 1201.
 Carbolated arnica salve, 1226.
 — camphor, 1257.
 — — ice, 1288.
 — — — glycerin, 1289.
 — glycerin honey, 1289.
 — tooth wash, 1272.
 Carbolates or phenates, 352.
 Carbolic acid or phenol, 351.
 — acid, 351, 864, 866.
 — — crude, 351, 352.
 — — crystallized, 351.
 — — glycerin, 731.
 — — liquefied, 352.
 — — ointment, 1095.
 — — solution, 948.
 — — suppositories, 980.
 — — troches, 1089.
 — — with vinegar, 339.
 — alkali, 1384.
 Carbolic salve or ointment, 1226.
 — tooth-ache cure, 1247.
 Carboline hair grower, 1280.
 Carbon, 264.
 — (element), 264.
 — amorphous, 264.
 — animalis, 491.
 — — purificatus, 491.
 — bisulphidum, 492.
 — compounds, 265.
 — disulphide, 492.
 — dioxide, 353.
 — duplicating paper, 1392.
 — forms of, 265.
 — oil, 863.
 Carbonates, 266, 353.
 Carbonei disulphidum, 492.
 Carbonic acid, 353.
 — — liquid, 353.
 — — true, 353.
 — anhydride, 353.
 — bisulphidum, 492.
 Carburet, 266.
 Carburetted, 266.
 — hydrogen, 267.
 Carborundum, 266.
 Cardamom, 142.
 — essence, 1316.
 — fluidextract, 142.
 — — comp., 142.
 — oil, 142, 830.
 — seeds, 142.
 — tincture, 1045.
 — — comp., 1045.
 Cardamomi semina, 142.
 Cardamomum, 142.
 Cardiac stimulant elixir, 627.
 Cardol, 126.
 Carica papaya, 203.
 Carlsbad salts, artificial, 1190.
 Carlsbad salt, effervescent, 1190.
 — water solution, 1345.
 Carminative, blackberry, 1062.
 — cordial, 1163.
 — Dewee's, 815.
 — ginger, 1163.
 — mixture, Paris, 1216.
 — species, 957.
 — tincture, 1046.
 Carminatives, 1162.
 Carmine, 151.
 — ink, 1387.
 — red coloring, 517.

Carmine solution, 517.
 Carminic acid, 151.
 Carnation (perfume), 1304.
 Carnauba wax, 146.
 Caroba, 184.
 — fluidextract, 184.
 Carobin, 184.
 Carota, 142.
 — fluidextract, 142.
 Cascara sagrada, 143, 212.
 — amarga, 143.
 — aromatic syrup, 988.
 — cordials, 569, 570.
 — extract, 662.
 — fluidextract, 143.
 — liquidextract, 144.
 — sagrada aromatic fluidextract, 703.
 — — cordials, 1166.
 — sagrada fluidextract, 702.
 — sagrada liquid extract, 702.
 — sagrada wine, 1123.
 Cascarilla, 144.
 — fluidextract, 144.
 — tincture, 1046.
 Cascarillin, 144.
 Cascarillin, 144.
 Casein, 122, 764.
 — mucilage, 1377.
 — saccharated, 765.
 Cashew-nut, 126.
 Cassia cinnamon, 150.
 — bark, 150.
 — buds, 150.
 — cosmetic, 1284.
 — essence, 1296.
 — fistula, 144.
 — pulp, 144.
 — or acacia perfume, 1295.
 — or cinnamon essence, 1316.
 Cassia pulpa, 144.
 Castanea, 144.
 — vulgaris, 144.
 Castile soap, 929.
 Castor, 144.
 — beaver, 144.
 — fiber, 144.
 — oil, 213, 828.
 — — hair oil base, 1281.
 — — mixture, 815.
 — — plant, 213.
 — tincture, 1046.
 Castoreum, 113, 144.
 Castoria, 1167.
 Castorol, 1167.
 Carrageen syrup, 1021.

Carragheen, 148.
 Carron oil, 767.
 Carthamus, 142.
 Carum, 143.
 — carvi, 143.
 Carui fructus, 143.
 Carvol, 143.
 Carya alba, 143.
 Caryophyllic acid, 143.
 Caryophyllin, 143.
 Caryophyllum, 143.
 Caryophyllus, 143.
 Cataplasma
 kaolini, 492, 1256.
 Cataplasm of kaolin, 492.
 Cataria, 144.
 Catarrh cure,
 Katona, 1165.
 — cream balm, 1165.
 — oil, 1164.
 — remedies, 1163.
 — remedy, 1164.
 — root, 170.
 — salve, 1166.
 — snuff, 1166.
 Catarrhal balm, 1164.
 — nebulizer liquid, 1218.
 — powder, Birney's, 1164.
 Catarrholeum, 1164.
 Catawba syrup, 1334.
 — wine, 1114.
 — — essence, 1364.
 — — dry, 1365.
 — — sweet, 1365.
 Catechu, 721.
 — areca, 129.
 — lozenge, 1090.
 — tincture, 1046.
 Cathartic acid, 222.
 — comp. pills, 879.
 — — improved, 897.
 — cordial, 1166.
 — elixirs, 571, 572.
 — liver pills, 1169.
 — pills, vegetable, 879.
 Catholicon, uterine, 1249.
 Catnep, 144.
 — oil, 144.
 — tea, 144.
 Caulophyllin, 145.
 Caulophyllum, 145.
 Caustic balsam, 1153.
 — lunar, 452, 453.
 — mitigated, 453.
 — potash, 892.
 — potassa, 892.
 — soda, 939.
 — toughened, 453.
 Cayenne pepper, 142.
 Ceanothus, 145.

Ceanothus
 fluidextract, 145.
 — syrup, comp., 1021.
 Cedar, red, 185.
 — oil, 185.
 Celastrus, 145.
 — scandens, 145.
 Celerina, 1221.
 Celery, 128.
 — compound, 1220.
 — elixirs, comp., 572, 573.
 — essence, 1316.
 — fluidextract, 128.
 — oil, 128.
 — seed, 128.
 Cements, 1373.
 Candleberry 146.
 Candied pop corn, 1349.
 Cannabis Indian
 tincture, 1043.
 Cement, amber, 1374.
 — chrome, 1374.
 — diamond, 1373.
 — for lamps, 1374.
 — glass to metal, 1374.
 — glutina, 1373.
 — liquid, 1375.
 — metal, 1374.
 — porcelain, 1375.
 — rubber, 1374.
 — — tire, 1374.
 — transparent, 1374.
 — universal, 1375.
 Centaury, 145.
 — American, 216.
 — European, 145.
 — — fluidextract, 216.
 Centrifugator, 97.
 Centurea, 145.
 — benedicta, 145.
 Cephalanthus, 145.
 Cera alba, 146, 493.
 — beeswax, 113.
 — flava, 146, 493.
 Cerae—Waxes, 146, 493.
 Cerata—Cerates, 493.
 Cerate, 494.
 — blistering, 495.
 — camphor, 494.
 — cantharides, 495.
 — lead subacetate, 495.
 — rosin, 495.
 Cerates, 493.
 Ceratic acid, 146.
 Ceratum, 494.
 — camphoræ, 494.
 — cantharides, 495.
 — plumbi subacetatis, 495.
 — resinæ, 495.
 — — compositum, 496.

- Cereus, night-bloom-
 ing, 138.
 — Bonplandii, 138.
 — McDonaldia, 138.
 Ceresin, 146.
 Cerevisia fermentum, 167.
 Ceria, 317.
 Ceric salts, 267.
 Cerii oxalas, 497.
 Cerite, 267.
 Cerium, 267, 496.
 — (element), 267.
 — oxalate, 497.
 Cerolein, 146.
 Cereoli, 496.
 Cerous salts, 267.
 Cetaceum, 113, 147.
 Cetraria, 147.
 — decoction, 532.
 Cevadilla, 215.
 — vinegar, 339.
 Ceylon cinnamon, 150.
 Chalk and opium powder, aromatic, 905.
 — French, 1025.
 — mixture, 813.
 — — Richard's, 1216.
 — powder, aromatic, 905.
 — — compound, 906.
 — prepared, 484.
 — precipitated, 484.
 Chalybeate pills, 880.
 Chamælin, 178.
 Chamomile, 127.
 — extract, 650.
 — flowers, 127.
 — fluidextract, 127.
 — German, 194.
 — — fluidextract, 194.
 — oil, 127, 835.
 Champagne syrup, 1334.
 Charcoal, 265, 491.
 — animal, 266, 491.
 — tooth paste, 1274.
 — wood, 265, 491.
 — willow, 492.
 Chartæ, 497.
 Charta potassii nitrat, 498.
 — sinapis, 497.
 Chartreuse, 1370.
 — elixir, 1370.
 — green, 1370.
 — yellow, 1370.
 Chaulmogra, 176.
 — oil, 176, 830.
 Cheap extracts, flavoring, 1323.
 — mucilage, 1377.
 Cheese rennet, 170.
 Chelidonic acid, 147.
 Chelidonium, 147.
 — fluidextract, 147.
 Chelone, 147.
 Chelonin, 148.
 Chemistry, 237.
 Chemical elements, 237, 326.
 — combinations, 326.
 — compounds defined, 326.
 — electrical state, 326.
 — food, 1017.
 — ions, 326.
 — nomenclature, 238.
 — terms and definitions, 31.
 — thermometers, 78.
 Chenopodium, 148.
 — oil, 148.
 Cherry essence, 1316.
 — fruit syrup, 1331.
 — laurel leaves, 188.
 — — water, 188, 448.
 — — — quadruple, 449.
 — pectoral, 1229.
 — phosphate syrup, 1335.
 — syrup, 1334.
 — tooth paste, 1274.
 — wild, elixirs, 624.
 — wine, 1365.
 Chestnut, 144.
 — leaves, 144.
 — — fluidextract, 144.
 Chewing gums, 1353.
 Chewstick, 174.
 Chian turpentine, 852.
 Chilblain ointment, 1174.
 Child's laxative, 1167.
 Chill cure, 1140.
 Chimaphila, 148.
 — fluidextract, 689.
 Chimaphilin, 148.
 China, 498.
 — clay, 421, 762.
 — rhizome, 224.
 — root, 170, 224.
 — — fluidextract, 224.
 — varnish balsam, 134.
 Chinaphenine, 866.
 Chinawein, 1116.
 Chinese sumach, 121.
 Chininum, 498.
 Chionanthus, 148.
 Chino— 498.
 Chinoidin, 508.
 Chinoidine, 508.
 Chinol, 499.
 Chinolina, 498.
 Chinoline, 498, 916.
 Chinoline
 bisulphate, 499.
 — hydrochloride, 499.
 — mono-hydrochloride, 499.
 — ortho-ethox-anamobenzoylamide, 499.
 — phenolsulphone, 499.
 — salicylate, 499.
 — tartrate, 499.
 Chirata, 148.
 — fluidextract, 148.
 Chiratin, 148.
 Chiretta, 148.
 — concentrated solution, 777.
 — fluidextract, 689.
 — infusion, 753.
 — tincture, 1046.
 Chittam bark, 212.
 Chlor-acetic acids, 362.
 Chloral, 411.
 Chloralamide, 500, 501.
 Chloral-ammonium, 501.
 — bromide compound, 1221.
 — camphor, 501.
 — carbamide, 501.
 — carbol, 501.
 — formamide, 501.
 — hydras, 500.
 — hydrate, 500.
 — menthol, 502.
 — syrup, 988.
 — urethane, 502.
 Chloralum hydratum, 500.
 Chlor-anodyne, 1144.
 Chloramide, 502.
 Chlorates, 268.
 Chlorbutanol, 502.
 Chloretone, 330, 502.
 Chloric ether, 963.
 — — spirit, 963.
 Chlorides, 268, 362.
 — elixirs, 574.
 — of lime, 487.
 Chlorinated lime, 487.
 — lime solution, 776.
 — soda solution, 794.
 Chlorine, 267, 502.
 — compounds, 268.
 — — with hydrogen, 268.
 — — with oxygen, 268.
 — acids of, 503.
 — solution comp., 777.
 — water, 777.
 Chlorodyne, 1047, 1222.
 Chlorodynia, 1222.
 Chloroform, 503.
 — albuminated, 504.

- Chloroform and morphine tincture compound, 1047.
 — benzoated, 504.
 — camphor, 504.
 — emulsion, 637.
 — glycerinized, 504.
 — glycerinatum, 504.
 — liniment, 768.
 — mixture, 637.
 — phosphorated, 504.
 — spirit, 963.
 — tincture comp., 1046.
 — water, 445.
 Chloroformamide, 500.
 Chloroformamidum, 500.
 Chloroformates, 504.
 Chloroformum, 503.
 — albuminatum, 504.
 — benzoatum, 504.
 — phosphoratum, 504.
 Chlorophyl, 505.
 — solutions, 505.
 Chocolata, 505.
 Chocolate and coca, 505.
 — caramels, 1349.
 — syrup, 1335, 1343.
 Cholagogue, 1139.
 — Osgood's, 1140.
 Cholera drops, Russian, 1172.
 — — Thielmann's, 1172.
 — mixture, Jackson's, 1216.
 — — New York Sun, 1171.
 — — Sparkman's, 1172.
 — — Squibb's, 1172.
 — powder, hog, 1262.
 — remedy, sedative, 1171.
 — — stimulating, 1170.
 — remedies, 1170.
 — tincture, Asiatic, 1171.
 — specific, Australian, 1171.
 Chondrus, 148.
 Chrysarobinum, 149.
 Christopher's root, 119.
 Chromates, 354.
 Chrome alum, 269.
 — green, 269.
 — yellow, 269.
 Chromic acid, 506.
 — acid solution, 772.
 — anhydride, 353.
 — salts, 269.
 — sesquioxide, 354.
 Chromii trioxidum, 506.
 Chromium, 269, 505.
 — (element), 269.
 — compounds, 269, 506.
 — anhydride, 506.
 — sulphate, 269.
 — trioxide, 269, 353, 506.
 Chromographic inks, 1390.
 Chromous salts, 269.
 Chrysarobin, 149, 354, 506.
 — crude, 129.
 — ointment, 1099.
 Chrysarobinum, 506.
 Chrysene, 888.
 Chrysophan, 212.
 Chrysophanic acid, 212.
 Cicily, sweet, 210.
 — — fluidextract, 201.
 Cicuta virosa, 154.
 — maculata, 154.
 Cider, 1362.
 — apple, 1362.
 — vinegar, 334.
 Cigarettes, asthmatic, 1150.
 Cimicifuga, 149.
 — elixir, 554.
 — liquid extract, 689.
 Cimicifugin, 149.
 Cincho-quinine, 915.
 Cinchona, 149, 507.
 — alkaloids, 507.
 — and iron wines, 1122.
 — calisaya, 149.
 — flava, 149.
 — fluidextract, 689.
 — infusion acid, 753.
 — liquid extract, 690.
 — rubra, 149.
 — tincture, 1048.
 — — compound, 1049.
 — wine, 1123.
 Cinchonidine, 508.
 — dihybromide, 508.
 — elixirs, comp., 575.
 — salicylate, 508.
 — sulphate, 508.
 Cinchonidinæ sulphas, 507.
 Cinchonidinum, 508.
 Cinchonina, 508.
 Cinchoninæ sulphas, 509.
 Cinchonine, 508.
 — sulphate, 509.
 Cineol, 838.
 Cinkola tonic, 1242.
 Cinnabar, 285, 290.
 Cinnaldehydum, 150, 509.
 Cinnamic acid, 150, 509.
 — aldehyde, 509.
 Cinnamol, solution, 1303.
 Cinnamomi cortex, 150.
 — fructus immatura, 150.
 Cinnamomum, 150.
 — cassia, 150.
 — Saigonice, 150.
 — Zelanicum, 150.
 Cinnamon, 150.
 — cassia, 150.
 — saigon, 150.
 — essence, 1316.
 — oil, 837.
 — — synthetic, 1302.
 — powder, comp., 905.
 — spirit, 964.
 — syrup, 1335.
 — tincture, 1050.
 — water, 446.
 Cinnamyl, 509.
 Cissampeline, 203.
 Cistamine, 737.
 Cistogen, 737.
 Citral, 839.
 Citrates, 354.
 Citrated caffeine, 481.
 Citric acid, 354.
 — — solution, 948.
 — — syrup, 985.
 Citrine ointment, 1102.
 Citrophen, 866.
 Citutine, 523.
 Civet, 151.
 — extract, 1297.
 Civetta, 151.
 Clam bouillon, 1344.
 — juice, 1344.
 Claret syrup, 1335.
 — wine, 1365.
 — — essence, 1364.
 Clarified honey, 810.
 Clay, China, 421.
 Cleaning cream, 1381.
 Cleavers, 170.
 — fluidextract, 170.
 Clevite, 275.
 Clifford's shampoo comp., 1286.
 Clinical thermometers, 78.
 Cloth and glove cleaner, 1381.
 — — Imperial, 1381.
 — cleaning comp., 1380.
 Clothes cleaning comp., 1381.
 — cleaner, Peerless, 1382.
 Clove anodyne toothache cure, 1247.
 — essence, 1316.
 Cloves, 143.
 — essence, 1296.

- Cloves fluidextract, 143.
 — infusion, 753.
 — oil, 143, 836.
 Clover, red,
 blossoms, 230.
 — — fluidextract, 230.
 — sweet, 194.
 Coal, 265, 266.
 — anthracite, 266.
 — cannel, 266.
 — soft, 266.
 — tar, 509, 888.
 — — derivatives, 509.
 — — creosote, 528.
 — — prepared, 887.
 — — solution, 789.
 Coated tablets, 1024.
 Coating, gelacacia
 pill, 876.
 — gelatin pill, 876.
 — pills, 875.
 — sugar pill, 875.
 Cobalt, 269.
 — compounds, 269.
 — salts, 269.
 — sulphate, 269.
 Cobaltic oxide, 269.
 Cobaltous chloride, 269.
 — nitrate, 269.
 Cobbler shakes, 1342.
 Coca, 151, 510.
 — and beef wine, 1124.
 — celery syrup, 1341.
 — guarana elixir, 577.
 — kola drinks, 1341.
 — cream, 1280.
 — elixir, 576, 580.
 — elixirs, comp., 576.
 — essence, 643.
 — fluidextract, 690.
 — koumiss, 764.
 — leaves, 151, 510.
 — liquid extract, 690.
 — syrup, 1341.
 — wine, 1116, 1123.
 — wine of, 1251.
 Coca folia, 151, 510.
 Cocaina, 510.
 Cocainæ hydrochlor-
 icum, 511.
 Cocaine, 151, 510, 1280.
 — borate, 511.
 — discs of, 766.
 — elixir, 577.
 — hydrochloride, 511.
 — hypodermic in-
 jection, 756.
 — liniment, 1208.
 — nitrate, 511.
 — ointment, 1099.
 — oleate, 847.
 Cocaine phenate, 511.
 — solution, 954.
 — tooth-ache cure, 1247.
 Coccus Indicis, 151.
 — — fluidextract, 151.
 Cocus, 113, 151.
 Cochineal, 151.
 — fruit, red, 518.
 — red coloring, 518.
 — tincture, 1051.
 Cochlearia, 152.
 — confection, 520.
 — fluidextract, 152.
 — spirit, 967.
 Cocillana bark, 227.
 — fluidextract, 227.
 Cocklebur, 235.
 — fluidextract, 235.
 Cockroach and bug
 destroyer, 1385.
 — Russian, 137.
 Cocktail shakes, 1342.
 Cocktails, 1368.
 — fruit, 1368.
 — other, 1368.
 Cocoa, butter of, 505.
 Coconut candy, 1349.
 — oil, 826.
 Codamine, 854.
 Codeina, 512.
 Codinæ phosphas, 512.
 — sulphas, 513.
 Codeine, 512, 854.
 — hydrochloride, 512.
 — nitrate, 512.
 — phosphate, 512.
 — Pure Food and
 Drugs Law, 513.
 — sulphate, 513.
 — syrup, 989.
 Cod liver oil, 826.
 — — — alkaloids, 826.
 — — — bases, 827.
 — — — emulsions,
 638, 640, 641.
 — — — com-
 pound, 638, 640.
 — — — iodo fer-
 rated, 1224.
 — — — phosphor-
 ized, 1224.
 — — — wine of, 1251.
 Coffee, 138.
 — arabica, 138.
 — elixir, 577.
 — extract or
 essence, 1319.
 — fluidextract, 139, 1319.
 — roasted, 139.
 — syrup, 1335, 1344.
 Cognac essence, 1316.
 Cohosh, black, 119, 149.
 — — fluidextract, 689.
 — — tincture, 1047.
 — blue, 145.
 — — fluidextract, 145.
 — red, 119.
 — white, 119.
 Coke, 265.
 Colchici cormus, 152.
 — semen, 152.
 — semina, 152.
 Colchicina, 152, 513.
 Colchicine, 152, 513.
 Colchicum, 152.
 — corm, 152.
 — extract, 652, 653.
 — seed, 152.
 — — fluidextract, 690.
 — — tincture, 1051.
 — — wine, 1117.
 — vinegar, 338.
 — wine, 1116.
 Colcothar, 280.
 Cold cream, thea-
 tre, 1270.
 Colic cure, 1264.
 — remedies, 1264.
 — remedy, hypo-
 dermic, 1264.
 — root, 122.
 Collinsonia, 152.
 — fluidextract, 152.
 Collinsonin, 152.
 Collodia—Collo-
 dions, 514, 514.
 Collodion, 514.
 — acetone, 516.
 — flexible, 517.
 — antiseptic styptic, 516.
 — blistering, 514, 515.
 — cantharidal, 514.
 — corn, German, 516.
 — — Liebig's, 516.
 — depilatory, 1277.
 — flexible, 515.
 — hæmostatic, 516.
 — iodoform, 516.
 — iodonol, 516.
 — Liebig's corn, 516.
 — salicylic acid
 comp., 516.
 — styptic, 515.
 — — antiseptic, 516.
 — thiol, 1031.
 — tooth-ache, 1249.
 Collodium, 514.
 — cantharidatum, 514.
 — flexile, 515.
 — stypticum, 515.
 — vesicans, 338, 515.
 Colocynth, 152.

- Colocynth apple, 153.
 — fluidextract, 153.
 — and hyoscyamus pills, 880.
 — comp. pills, 880.
 — extract, 653.
 — — compound, 653.
 Colocynthin, 153.
 Colocynthis, 152.
 Cologne, floral, 1308.
 — Florida flowers, 1309.
 — formula, general, 1307.
 — forest flowers, 1309.
 — fragrant flowers, 1309.
 — German, 1308.
 — Hoyt's, 1308.
 — lavender, 1309.
 — musk, 1309.
 — spirit, 408.
 — white rose, 1309.
 Colognes and toilet waters, 1307.
 — standard, 1308.
 Colombo root, 139.
 — fluidextract, 140.
 — tincture, 140.
 Colophony, 916.
 Coloring, blue, 519.
 — burnt sugar, 517.
 — butter, 519.
 — carmine red, 517.
 — for hair oils, 1281.
 — green, 518.
 — orange, 519.
 — red, 518.
 Colorless solution hydrastine, 1250.
 Colores—Colors, 517.
 Colors, aniline, permissible, 1399.
 — for perfumes, 1307.
 — for powders, 520.
 — Pure Food and Drugs Law, 517.
 Coltsfoot, 231.
 — fluidextract, 231.
 Columbia infusion, 753.
 Columbium, 270.
 — (element), 270.
 — compounds, 270.
 Columbo, American, 169.
 — fluidextract, 169.
 Combination, 82.
 Combinations of phosphorus, 868.
 Combustion, 92.
 Comedones lotion, 1291.
 Comfrey, 227.
 Commination, 83.
 Composita, 882.
 Composition of the earth, 242.
 Compressed tablets, 1024.
 Concentrates, eclectic, 920.
 — general formula, 920.
 Concentrated fruit syrups, 1331.
 — nitrous ether, 959.
 Concentration, 84.
 Condensed cream, 764.
 — milk, 764.
 Condition balls, 1260.
 — powders, 1261.
 — — diuretic, 1261.
 — — mineral, 1261.
 — — vegetable, 1261.
 Condurango, 153.
 — bark, 153.
 — fluidextract, 153.
 — wine, 1117.
 Cond's fluid or solution, 1383.
 Cone-flower, 161.
 — fluidextract, 161.
 Confectio opii, 521.
 — piperis, 521.
 — rosæ, 521, 522.
 — — gallicæ, 522.
 — scammonii, 522.
 — sennæ, 522.
 — sulphuris, 523.
 Confection of cherry laurel, 521.
 — hips, 521.
 — opium, 521.
 — pepper, 521.
 — roses, 522.
 — scammony, 520.
 — scurvy grass, 520.
 — senna, 522.
 — sulphur, 523.
 Confections—Confections, 520, 523.
 Confections and conserves, 520.
 — other, 523.
 Congress water solution, 1345.
 Conii folia, 153.
 — semen, 153.
 Conicine, 523.
 Coniina, 153.
 Coniine, 153, 523.
 — hydrochloride, 523.
 Conium, 153.
 — fruit, 153.
 — leaves, 153.
 — and iron elixir, 577.
 — fluidextract, 690.
 — juice, 973.
 Conserve de coch-
 leria, 520.
 — de laurier cerise, 520.
 Consumption remedy, 1178.
 Convallaria, 154.
 Convallamarin, 154.
 Conveniences for pill making, 872.
 Convulvulic acid, 184.
 Convulvulin, 184, 851.
 Copaiba, 154, 851.
 — balsam, 154.
 — resin, 917.
 — santal and cubeb mixture, 1216.
 — oil, 837.
 — resin, 917.
 — santal and cubeb mixture, 1216.
 Copaiva, 154.
 — balsam, 154.
 Copper, 270.
 — albumin, 530.
 — alloys, 270, 530.
 — nucleinate, 531.
 — oleate, 849.
 — salts of, general, 271.
 — sulphate, 530.
 — — anhydrous, 530.
 — — dried, 530.
 — tempered, 271.
 Coptis, 154.
 — anemonæ folia, 154.
 — fluidextract, 154.
 — trifolia, 154.
 — teeta, 154.
 Copying inks, 1389.
 — pad, hectograph, 1390.
 Coral lip salve, 1280.
 Corallin, 430.
 Cordial, aletris, 1197.
 — anise seed, 548.
 — anisette, 1369.
 — aromatic, 524.
 — blackberry, 1184.
 — calisaya, 524.
 — carminative, 1163.
 — cascara, 569, 1166.
 — cathartic or laxative, 1166.
 — curacao, 524.
 — diuretic, 1205.
 — Fosgate's anodyne, 1258.
 — gentian, 525.
 — gin, London, 1357.
 — Godfrey's, 1257.
 — mother's, 1197.
 — strengthening.
 McLean's, 1245.

- Cordial, tonic health, 1157.
 Cordials—Cordials, 524.
 — cascara, 570.
 — spiritous, 1355, 1368.
 Coriander, 154.
 — fluidextract, 155.
 — fruit, 154.
 — essence, 1317.
 — oil, 155, 837.
 — seed, 155.
 Coriandrol, 154.
 Corks, prepared, 1400.
 Corn, Bunion and Chillin Remedies, 1177.
 Corn cure, German, 516.
 — ergot, 231.
 — — fluidextract, 231.
 — killer, 1173.
 — plaster, 634, 1173.
 — remover for soft corns, 1174.
 — remover, night, 1174.
 — salve, caustic, 1173.
 — salve, magic, 1173.
 — silk, 192, 235.
 — — fluidextract, 192, 235.
 Cornsmut, 231.
 Cornelian, 305.
 Cornin, 155.
 Cornu cervi, 113, 155.
 — — artificiale, 155.
 — — praeparatum, 155.
 — — ustum, 155.
 Cornutein, 164.
 Cornus, 155.
 — circinata, 155.
 — florida, 155.
 — sericea, 155.
 Corrector, heart, 1200.
 Corrigenes elixir, 625.
 Corrosive mercuric chloride, 740.
 — sublimate, 289, 740.
 — — solution, 785.
 — — elixir, 577.
 Cortex coto, 156.
 — cornus, 155.
 Cortices—Barks, 155, 256.
 Corundum, 247.
 Corydalis, 156.
 — fluidextract, 156.
 Corydalin, 156.
 Corydaline, 156.
 Corydalis elixir, 578.
 — comp. elixir, 578.
 — elixir, 578.
 — syrup, comp., 1021.
 Cosmetic base, stick, 1283.
 Cosmetics for the complexion, 1266.
 — liquid, 1266.
 — lip, 1290.
 — stick (pomades), 1283.
 Cosmoline, 861.
 Cotarine, 854.
 Cotarnine hydrochloride, 526.
 — phthalate, 526.
 Coto, 156.
 — bark, 156.
 — — fluidextract, 156.
 — tincture, 1052.
 Cotoin, 156.
 Cotton, 174.
 — absorbent, 733.
 — gun, soluble, 911.
 — purified, 174, 733.
 — root bark, 174.
 — — fluidextract, 174.
 — root wine, 1124.
 — seed oil, 174.
 — wool, 175, 733.
 Cottons, medicated, 734.
 Cottonseed oil, 826.
 Couch grass, 230.
 — — fluidextract, 230, 709.
 Cough balls, 1260.
 — balsam, 1176.
 — candy, 1183.
 — comp., terpin, 1181.
 — — terpin and heroin, 1181.
 — cordial, 1176.
 — drops, 1183.
 — honey, 1177.
 — lozenges or troches, 1183.
 — mixture, 1177.
 — — Jackson's, 1216.
 — — Pancoast's, 1216.
 — pills, 1230.
 — remedy, 1175.
 — — sedative, 1181.
 — — without sugar, 1175.
 — remedies, 1174.
 — syrup, 1177.
 — — baby, 1176.
 Coumarin, 230, 1300.
 — solution, 1303.
 Court plaster, 631.
 Coutaret's white fluid, 1384.
 Cowhage, 197.
 Crab orchard salt, 1234.
 Crab orchard salt, effervescent, 1190.
 Cramp bark, 234.
 — — elixir comp., 623.
 — — fluidextract, 234, 710.
 Cranberry, high bush, 234.
 — tree, 234.
 Cranesbill, 172.
 — fluidextract, 172.
 Crealbin, 527.
 Cream, almond tooth, 1272.
 — balm, catarrh, 1165.
 — camphor, 1268.
 — — antiseptic, 1314.
 — cleaning, 1381.
 Creams, complexion, 1267.
 — condensed, 764.
 — cocoa, 1280.
 — cold, theater, 1270.
 — dates, 1350.
 — fragrant, 1268.
 — glycerin, 1269.
 — ice, 1347.
 — imperial vanishing, 1269.
 — malvina, 1269.
 — marshmallow, 1269.
 — massage, 1293.
 — of lilies, 1266.
 — of roses, 1266.
 — of tartar, 903.
 — peerless vanishing, 1269.
 — shaving, 1269.
 — — for metal tubes, 1269.
 — sherbet, 1348.
 — soda, ice, 1341.
 — taffy, 1352.
 — tooth, almond, 1272.
 — — imperial, 1273.
 Creams, cooked, 1350.
 — uncooked, 1350.
 — walnut, 1350.
 Cr  de's antiseptic, 306.
 Cr  me de menthe, 1370.
 Creoform, 528.
 Creolin, 526, 529.
 — disinfectant, 1384.
 — Pearson, 527.
 Creosotal, 528.
 Creosote carbonate, 528.
 — coal-tar, 528.
 — compounds, 527.
 — magnesol, 528.
 — mixture, 813.
 — ointment, 1099.

Creosote phosphate, 528.
 — phosphite, 528.
 — tannate, 528.
 — water, 446.
 Creosotum, 527.
 — beech wood, 527.
 Cresal, 528.
 Cresalbin, 528.
 Cresalol, 529.
 Cresoform, 528.
 Cresol, 528, 866, 888.
 — comp. solution, 778.
 — iodide, 529.
 — naphthol, 529.
 — salicylates, 529.
 — salols, 529.
 — valerianate, 528.
 Cresylic acid, 528, 866.
 Cresolic acids, 529.
 Creyat, 126.
 Crocus, 156.
 — martis, 280.
 — of antimony, 254.
 Croton chloral-
 hydrate, 479.
 — eluteria, 144.
 — oil, 829.
 — — liniment, 769.
 Crude petroleum oil, 845.
 Crushed fruits, 1329.
 Cryolite, 273.
 Cryptogams, 108.
 Cryptopine, 854.
 Crystallization,
 systems of, 84.
 Crystals and Crystal-
 lization, 84.
 Crystals, washing, 13822.
 Cubeb, 156.
 — fluidextract, 157, 691.
 — oil, 837.
 — oleoresin, 850.
 — troches, 1090.
 Cubeba, 156.
 Cubebæ fructus, 156.
 Cubebæ, 156, 1053.
 Cubebin, 157.
 Cubebic acid, 157.
 Cubes, (bouillon), 1344.
 Cucumber elder flower
 cream, 1268.
 — seed oil, 830.
 — squirting, 162.
 Curcubita citrullus, 203.
 — melo, 204.
 — pepo, 204.
 Cudbear, 204.
 — tincture, 204.
 — red, 518.
 Culina mariana, 161.
 Culver's root, 189.

Culver's root ext., 658.
 — fluidextract, 189, 698.
 Cumin seed, 157.
 — — oil, 157.
 Cuminum, 157.
 Cuprated hemol, 531.
 Cupratin, 530.
 Cupri sulphas, 530.
 Cupric sulphate, 530.
 — salts, 270.
 Cuprohemol, 531, 736.
 Cuprol, 531.
 Cuprous salts, 270.
 Cuprum—Copper, 529.
 Curaçoa, 1371.
 — bitter, 1371.
 — cordial, 524.
 — elixir, 524.
 — essence, 1317.
 Curare, 157.
 — hypodermic injec-
 tion, 756.
 Curarine, 157.
 — hydrochloride, 157.
 Curative syrup, Mother
 Seigle's, 1193.
 Curcuma, 157.
 Curd soap, 929.
 Cure, ague, 1139.
 — asthma, 1149.
 — chill, 1140.
 — dandruff, 1277.
 — — peerless, 1277.
 — earache, 1188.
 — for baldness, 1276.
 — gall, 1264.
 — gold hypo. inj., 1215.
 — — tonic, 1215.
 — pain, 1152.
 — rheumatic, 1233.
 — spavin, 1214.
 Cures, ague, 1139.
 — gonorrhœa, 1199.
 — liquor and habit, 1214.
 — tooth-ache, 1247.
 Currant fruit syrup, 1331.
 Curry powder, 1400.
 Cyanates, 364, 531.
 Cyanic acid, 364, 531.
 Cyanide of mercury, 741.
 Cyanides, 364, 531.
 Cyanogen, 364, 531.
 — hydroxide, 364.
 Cyanurets, 531.
 Cyclamen (per-
 fume), 1304.
 Cydonium, 158.
 Cymogene, 863.
 Cynoglossum, 158.
 Cyprisedin, 921.
 Cyprisedium, 158.

Cypripedium fluid-
 extract, 691.

D

Dalby's carminative
 elixir, 626.
 Damiana, 159.
 — bitters, 159.
 — comp. elixirs, 578.
 — elixir, 578.
 — fluidextract, 159.
 — lozenges, 1148.
 — tonic, 1147.
 — wine, 1124.
 Dandelion elixir, 579.
 — comp. elixir, 579.
 — extract, 665.
 — fluidextract, 708.
 — juice, 973.
 Dandruff cure, 1277.
 — — peerless, 1277.
 — remedy, 1277.
 Danzig-spruce, 115.
 Dates, cream, 1350.
 Daucus carota, 142.
 Dead oil, 351.
 Decimal scale, 1136.
 Decocta—Decoctions, 97.
 — by water-bath per-
 colation, 531.
 — aloes comp., 533.
 — cetraria, 532.
 — jequirity, 533.
 — logwood, 533.
 — pomegranate
 bark, 533.
 — sarsaparilla comp., 532.
 Decoctum aloes com-
 positus, 533.
 — cetraria, 532.
 — granati corticis, 533.
 — hæmatoxyli, 533.
 — sarsaparillæ
 compositus, 532.
 Deer's horn, 155.
 — — preparations, 155.
 Diarrhœa mixture,
 Velpeau's, 1217.
 Delphinine, 159, 225.
 Delphinum, 159.
 Deliquescence, 87.
 Denatured alcohol, 407.
 Densities of gases, 245.
 — metals, 244.
 — not-metals, 244.
 Densimeters, 72.
 Dentifrices, 1271.
 Dentist's plaster, 264, 497.
 Deodorized alcohol, 408.
 — tinct. of opium, 1070.
 Depilatories, 1277.

- Depilatory collo-
 dion, 1277.
 — liquid, 1277.
 — powder, 1277.
 Dermatol, 259.
 Desiccated suprarenal
 glands, 172.
 — thyroid glands,
 173, 1032.
 Desiccation, 92.
 Desiccator, 92.
 Deslaurier's elixir, 627.
 Destillatæ—Distil-
 lates, 534.
 Destroyer, bug and
 cockroach, 1385.
 Detannated sherry, 1120.
 Deuterotine, 854.
 Devil's bit, 178.
 Dewee's carminative, 815.
 Dextrin, 125, 534.
 — mucilage,
 534, 1377, 1378.
 — syrup, 534.
 — white, 534.
 — yellow, 534.
 Dextrinum, 534.
 Dextro-quinine, 915.
 Diacetyl morph-
 ine, 737, 819.
 Diachylon oint-
 ment, 1100.
 Dialysatæ—Dialy-
 sates, 535.
 Dialysate of aconite, 535.
 — of belladonna, 535.
 Dialysed iron, 535.
 — soap, 536.
 — — syrup, 1008.
 — in scales, 535.
 Dialysis, 87.
 Dialyzer, 87.
 Diamines, 250.
 Diamond, 265.
 — cement, 1373.
 Diarrhœa mixture,
 Gould's, 1217.
 — tablets, 1185.
 Diastase, 536.
 Dictamus, 159.
 — fluidextract, 159.
 Diethelen-diamine, 885.
 Diethyl-acetal, 328.
 Diethyl-aldehyde, 328.
 Diethylamide, 1112.
 Diethylbarbituric
 acid, 1114.
 Diethylmalonylurea,
 1114.
 Diffusate, 87, 88.
 — battery, 88.
 Diffusion, 88.
 Digalen, 160.
 Digestic elixir, 626.
 Digestive dyspepsia
 remedy, 1186.
 Digipuratum, 160.
 Digistrophan, 160.
 Digitalein, 159.
 Digitalin, 159.
 — verum, 160.
 Digitalis, 159.
 — elixir, 580.
 — extract, 654.
 — fluidextract, 691.
 — infusion, 752, 753.
 — — concentrated, 755.
 — vinegar, 339.
 Digitalone, 160.
 Digitalysatum, 160.
 Digitin, 159.
 Digitol, 160.
 Digitonin, 159.
 Digitoxin, 159.
 Di-iodo-para-phenol
 sulphuric acid, 378.
 Dill fruit, 127.
 — essence, 1317.
 — oil, 835.
 — pickles, 127.
 — water, 443.
 Dimethylarsenate, 308.
 Dimethyl carbinol, 428.
 Dimethyl-isoamyl-
 benzene, 464.
 Dinitro-cellulin, 912.
 Dionine, 854.
 Dioscorea, 160.
 Dioscorein, 160.
 Diospyros, 160.
 — kaki, 160.
 — virginiana, 160.
 Dioxydiamino-arseno-
 benzol, 926.
 Diphtheria anti-
 toxin, 931.
 Dippel's animal oil, 829.
 Dirca, 160.
 Discovery, medical, 1237.
 Discs, 766.
 — or pellets, 1136.
 — of atropine, 766.
 — cocaine, 766.
 — homatropine, 766.
 — physostigmine, 766.
 Discutient ointment, 1111.
 Disinfectants, 1382.
 Disinfecting pow-
 ders, 1383.
 — solutions, 1383.
 — — proprietary, 1384.
 Distillate, 91, 463.
 Distillation, 88.
 — dry, 89.
 — tractional, 91.
 — history of, 88.
 — kinds of, 89.
 — of oils, 832.
 — principles of, 89.
 Distilled water, 441.
 Distilling apparatus, 90.
 Dita bark, 124.
 Ditamine, 124.
 Dithymoldiiodide, 456.
 Dittany, 161.
 — oil, 161.
 Diuretic condition
 powders, 1261.
 — cordial, 1205.
 — elixir, 557.
 — — Wayne's, 557.
 — species, 957.
 Diuretin, 1030.
 — lithium, 1111.
 — sodium, 1111.
 Dobell's solution, 1147.
 Dog button, 198.
 — violet, 165.
 Dogwood bark, 155.
 — fluidextract, 155.
 — Jamaica, 207.
 — swamp, 155.
 Donovan's solution,
 774.
 Double spruce, 115.
 Dover's powder, 907.
 — syrup, 1022.
 — tincture, 1061.
 Dracontium, 161.
 — fluidextract, 161.
 Dragon root, 130.
 Dragon's blood, 218.
 Draught, black, 753.
 Dressing, patent
 leather, 1394.
 — government
 harness, 1394.
 — petrolatum shoe, 1394.
 — bronze shoe, 1394.
 — shoe, 1393.
 Dried alum, 418.
 — sodium carbon-
 ate, 937.
 Driers for pills, 873, 874.
 Drops, cholera,
 — Russian, 1172.
 — — Thielmann's, 1172.
 — cough, candy, 1183.
 — pectoral, Bate-
 man's, 1229.
 Drosera, 161.
 — fluidextract, 161.
 Drugs, animal, 112.

- Drugs, chemicals and preparations, 327.
 — vegetable, 110.
 Dry catawba wine, 1365.
 — heat processes, 92.
 — thyroid, 173, 1032.
 — shampoo, 1286.
 Dubosia, 161.
 — fluidextract, 161.
 Duboisine, 161.
 — sulphate, 161.
 Dulcamara, 161.
 — fluidextract, 161.
 Dulcit, 923.
 Dulcite, 724.
 Dulcitol, 923.
 Duotal, 735.
 Duplex extracts, 328, 649.
 Dusting powder, thiol, 1031.
 Dutch liquid, 399.
 — metal, 271.
 Dwarf elder, 128.
 Dye, hair, black, one preparation, 1279.
 — — bismuth, 1279.
 — — vanadium, 1279.
 — lac, 187.
 — lightning, black, 1278.
 — — brown, 1278.
 Dyes, hair, 1278.
 Dyoprosium (element) 272.
 Dyspepsia, Remedies, 1185.
 — remedy, 1186.
 — tablets, 1187.
 — tonic, 1186.
 Earache cure, 1188.
 — oil, 1187.
 Earth, composition of, 242.
 — wax, 146.
 Earths, alkaline, 412.
 — rare, (chemistry), 267.
 Easton's syrup, 991.
 Eau de Botot, 1276.
 — angelique, 1273.
 Ecballium elaterium, 162.
 Ecbole, 164.
 Ecgonine, 151.
 Echafolta, 162.
 Echidine, 162.
 Echinacea angustifolia, 161.
 — purpurea, 161.
 — fluidextract, 161.
 Echitamine, 124.
 Echitamine, 124.
 Eclectic extracts, 920.
 Eclectric liniment, 1209.
 — oil, 1209.
 Echthol, 162.
 Ecuelle, 832.
 Eczema lotion, 1286.
 Effervescent bromoacetanilide caffeine, 1188.
 — bromo-caffeine, 1188.
 — bromopyrine, 1189.
 — bromo-seltzer, 1189.
 — caffeine citrate, 481.
 — Carlsbad salt, 1190.
 — crab orchard salt, 1190.
 — citrated caffeine, 1189.
 — Kissingen salts, 1190.
 — lithium citrate, 800.
 — phenacetin with caffeine, 1190.
 — potassium citrate, 897.
 — powder of artificial Carlsbad salt, 1191.
 — salts, general directions for preparing, 1188.
 — sodium citro-tartrate, 939.
 — — phosphate, 941.
 — tablets, 1025.
 — vichy salt, 1191.
 Effervescing powder compound, 906.
 Efflorescence, 86.
 Egg food, 1263.
 — hen's egg, 201.
 — nogg syrup, 1335.
 — ointment, 110.
 — phosphate shake, 1343.
 — shampoo, 1286.
 — shell, 201.
 — white of, 122.
 — — dried, 122.
 — white of, 201.
 — yolk of, 201, 234.
 Egyptian ointment, 1110.
 Eisenzuckersirup, 990.
 Elastic or mouth glue, 1376.
 Elastica, 141, 162.
 Elaterin, 162, 537.
 — compound powd., 906.
 — trituration, 1087.
 Elaterium, 162, 536.
 Elder berries, 217.
 — — juice, 217.
 — dwarf, 128.
 — — fluidextract, 217.
 — flowers, 217.
 Elder flowers cream, 1268.
 — — water, 217, 451.
 — prickly, 129.
 Elecampane, 182.
 — fluidextract, 182.
 Electricity, bottled, 1202.
 Electrotype molds, 257.
 Electrolysis, 326.
 Electuaries, 520, 523.
 Elements, chemical, 237.
 — melting points of, 245.
 — boiling points of, 245.
 — periodic arrangement, 240.
 Elemi, 852.
 Elephantopus, 163.
 Elephant's foot, 163.
 Elixir acetanilide, 542.
 — — and caffeine, 543.
 — — fluidextract, 163.
 Elixir acetanilide, 542.
 — — and caffeine, 543.
 — aconite, 543.
 — adjuvans, 543, 544.
 — adjuvant, 544.
 — album, 617.
 — aletris comp., 545.
 — alkaline, 545, 617.
 — aloin, 545.
 — — and strychnine, 546.
 — — — and belladonna, 546.
 — — alteratives, 1203.
 — — amarum, 546.
 — — ammonia muriate, 546.
 — — ammonium bromide, 546.
 — — chloride, 546.
 — — valerate, 547.
 — — — and iron, 547.
 — — — and morphine, 547.
 — — — quinine, 548.
 — — — strychnine, 548.
 — — — with hydrated chloral, 547.
 — — analgesic, 548.
 — — anise, 548.
 — — anti-asthmatic, (Dr. Hare's), 549.
 — — anti-dyspeptic, 626.
 — — antifebrin, 542.
 — — antigoutteux de Villette, 626.
 — — antimony and potassium tartrate, 549.
 — — antipyrine, 549.
 — — aperitivam, 627.
 — — apii graveolentis comp., 573.

- Elixir aromatic, 549, 550.
 — arsenic, 550.
 — — and mercury iodide, 551.
 — — strychnine, 551.
 — atropine, 551.
 — aurantii, 604.
 — bark and iron, 565.
 — beef, 551.
 — — and coca, 1241.
 — — iron, 551.
 — — iron and cinchona, 552.
 — belladonna, 552.
 — berberine, 552.
 — — and iron, 553.
 — — bismuth and iron, 553.
 — bismuth, 553.
 — — and iron, 553.
 — — strychnine, 554.
 — — iron and strychnine, 553.
 — bitter, 546.
 — blackberry, 554.
 — black cohosh, 554.
 — — — comp., 554.
 — — haw, 555, 623.
 — brom-acetan-caffeine, 555.
 — bromo-caffeine, 556.
 — bromide-chloral, 613.
 — bromides comp., 555.
 — brom-iodide of calcium comp., 555.
 — buchu, 556.
 — — and potassium acetate, 557.
 — — pareira brava, 557.
 — — compound, 557.
 — — juniper and acetate of potassium, 557.
 — buckthorn, 582.
 — caffeine, 558.
 — — citrate, 576.
 — calcium bromide, 558.
 — — hypophosphite, 558.
 — — iodide, 558.
 — — lactoprophosphate, 558.
 — — — with pepsin, 559.
 — calisaya with various combinations, pages 561 to 568.
 — calmans, 626.
 — calumba, 576.
 — camphor, monobromated, 569.
 Elixir cardiac stimulant, 627.
 — — carminative, Dalby's, 626.
 — — cascara sagrada, 569.
 — — — aromatic, 570.
 — — — tasteless, 570.
 — — cathartic, 571.
 — — — comp., 571.
 — — or laxative, 572.
 — — celery and black haw comp., 572.
 — — — coca comp., 572.
 — — guarana, 573.
 — — compound, 572.
 — — chloral, 573.
 — — chloroform, 575.
 — — cimicifuga, 554.
 — — cinchona ferrated, 561.
 — — — with bismuth, 562.
 — — — — and strychnine, 562.
 — — — iron and strychnine, 562.
 — — cinchonidia, 575.
 — — cinchonidine, 575.
 — — — and iron, 575.
 — — — — strychnine, 575.
 — — — — arsenic, 575.
 — — — — Clauder's, 627.
 — — coca, 576, 580.
 — — — and calisaya, 576.
 — — — — ferriphosphated, 576.
 — — — guarana, 577.
 — — cocaine, 577.
 — — coffee, 577.
 — — conium and iron, 577.
 — — corrigens, 625.
 — — corrosive sub., 577.
 — — corydalis, 578.
 — — — compound, 578.
 — — cramp bark, 623.
 — — damiana, 578.
 — — — compound, 578.
 — — — iron, nux vomica and phosphorus, 579.
 — — — — nux vomica and phosphorus, 579.
 — — dandelion, 579.
 — — — compound, 579.
 — — de Garus, 627.
 — — Deslaurier's, 627.
 — — digesticum, 626.
 — — digitalis, 580.
 — — diuretic, 557.
 — — — Wayne's, 557.
 — — Dover's, 592.
 — — emmenagogue, 627.
 Elixir ergot, 580.
 — — erythroxylon 576, 580.
 — — — compound, 580.
 — — euonymus, 581.
 — — ferri, quininae et strychninae phosphatum, 581.
 — — five bromides, 555.
 — — — iodides, 592.
 — — — flavoring, 538.
 — — — soluble, 539.
 — — four iodides, 592.
 — — frangula, 582.
 — — gelsemium, 582.
 — — gentian with various combinations, pages 582 to 586.
 — — ginger, 586.
 — — glycerinophosphates comp., 587.
 — — — lime and soda, 587.
 — — glycyrrhiza, 601.
 — — — aromatic, 601.
 — — — comp., 601.
 — — gluside, 586.
 — — golden seal, 590.
 — — gout, 626.
 — — grindelia robusta, 588.
 — — guarana, 588.
 — — — and celery, 588.
 — — Haller's, 381.
 — — henbane, 591.
 — — helonias comp., 588.
 — — hops, 589.
 — — heroin, 588.
 — — — compound, 589.
 — — — and terpin hydrate, 589.
 — — humulus, 589.
 — — hydrangea, 590.
 — — — and lithium, 590.
 — — — lithium comp., 590.
 — — hydrastis, 590.
 — — — and iron, 590.
 — — — — and bismuth, 591.
 — — — — strychnine, 591.
 — — hyoscyamus, 591.
 — — hypophosphites compound, 591.
 — — iron with various combinations, pages 593 to 598.
 — — jaborandi, 598.
 — — juniper berries, 598.
 — — kairine, 598.
 — — kola, 599.
 — — — and celery compound, 599.
 — — — celery, 599,

- Elixir lactated pepsin, 599.
 — — — compound, 599.
 — lactopeptine, 600.
 — — and bismuth, 600.
 — — — and strychnine, 600.
 — lactucarium, 600.
 — laxative, 600.
 — liquorice, 601.
 — — — compound, 601.
 — lithium citrate, 601.
 — — salts, 602.
 — lithiated strontium compound, 602.
 — manaca and salicylates, 602.
 — mandrake comp., 602.
 — matico comp., 603.
 — mercury bichloride, 577.
 — migraine, 627.
 — mono-bromated camphor comp., 603.
 — morphine, 603.
 — — bromide, 603.
 — — valerate, 603.
 — muriate of iron, tasteless, 593.
 — musk root, 622.
 — — — compound, 622.
 — nitroglycerin compound, 603.
 — nux vomica, 604.
 — of gold, 627.
 — of health, 627.
 — of opium, McMunn's, 628.
 — of vitriol, 381.
 — one iodide, 591.
 — opium, 604.
 — orange, 604.
 — — — compound, 604.
 — pancreatin, 605.
 — — and pepsin, 605.
 — — pepsin and bismuth, 605.
 — paraldehyde, 606.
 — pareira brava, 606.
 — pectoral, 627.
 — pepsin, 606.
 — — and bismuth, 607.
 — — iron, 608.
 — — lactic acid, 609.
 — — quinine, 609.
 — — ptelea, 610.
 — — strychnine, 608.
 — — bismuth, iron and strychnine, 608.
 — — — and iron, 607.
 — — — strychnine, 608.
- Elixir pepsin, iron and strychnine, 609.
 — — — lactated, 609.
 — — — — compound, 609.
 — — — quinine and iron, 609.
 — — percolating menstruum, 539.
 — — Peruvian bark with "protoxide" of iron, 568.
 — — phosphates compound, 610.
 — — phosphates of iron, quinine and strychnine, 581.
 — — phosphori, 611.
 — — phosphoric acid, 610.
 — — phosphorus, 611.
 — — and nux vomica, 611.
 — — — compound, 611.
 — — — iron, quinine and strychnine, 612.
 — — pichi and saw palmetto comp., 612.
 — — pilocarpus, 598.
 — — pink root comp., 612.
 — — podophyllum compound, 602.
 — — potassium acetate, 612.
 — — — arsenite, 550.
 — — — bromide, 612.
 — — — and hydrated chloral, 613.
 — — — — compound, 613.
 — — — iodide, 614.
 — — — proprietatis, 628, 1036.
 — — — propylamine salicylate, 614.
 — — — protoxide iron, 614.
 — — — — and calcium iodide, 614.
 — — — — and quinine, 614.
 — — — — potassium iodide, 614.
 — — — quinine, 615.
 — — — bisulphate, 615.
 — — — bismuth and pepsin, 615.
 — — — — strychnine, 615.
 — — — bromide, 615.
 — — — phosphate, 615.
 — — — valerate, 616.
 — — — red, 617.
 — — — rhubarb, 616.
 — — — and columbo, 616.
- Elixir rhubarb and magesnia, 617.
 — — — potassium compound, 617.
 — — — compound with pancreatin, 545.
 — — — roborans, 627.
 — — — rubrum, 617.
 — — — saccharine, 586.
 — — — salicylic acid compound, 618.
 — — — salutis, 627.
 — — — sarsaparilla comp., 618.
 — — — saw palmetto compound, 619.
 — — — — and coca compound, 619.
 — — — sedative, 613.
 — — — senna, 619.
 — — — — compound, 620.
 — — — simple, 541.
 — — — sodium bromide, 620.
 — — — salicylate, 620.
 — — — squill comp., 619.
 — — — stillingia, 620.
 — — — — compound, 620.
 — — — Stoughton's, 627.
 — — — strontium salicylate comp., 621.
 — — — strychnine, 621.
 — — — valerate, 621.
 — — — sumbul, 622.
 — — — — compound, 622.
 — — — tartar emetic, 594.
 — — — taraxacum, 579.
 — — — — compound, 579, 622.
 — — — terpin hydrate, 622.
 — — — — and codeine, 623.
 — — — — — compound, 623.
 — — — — three iodides, 592.
 — — — — tonic, 627.
 — — — — two iodides, 592.
 — — — — veratrum viride, 623.
 — — — — valerian, 623.
 — — — — viburnum comp., 623.
 — — — — prunifolium, 623.
 — — — — vicerale, Hoffmann's, 604.
 — — — vitriol, 628.
 — — — wafer ash, 610.
 — — — wahoo, 581.
 — — — white, 617.
 — — — wild cherry, 624.
 — — — — comp., 625.
 — — — — — detanated, 624.
 — — — — — ferrated, 624.
 — — — — — ferriphosphated, 624.

- Elixir wild cherry ferro-phosphorated, 624.
 — — — from pitts, 624.
 — yellow jasmine, 582.
 — yerba santa, 625.
 — — — compound, 625.
 — zinc valerate, 626.
 Elixiria—Elixirs, 537.
 Elixirs chlorides, 573, 574.
 — detannating, 591.
 — iodides, 591.
 — made from fluid-extracts, 540.
 — of malt and compounds, 602.
 — of pepsin, 607.
 — requiring percolation, 540.
 — of strontium salts, 621.
 — with salts in solution, 541.
 Elm, 231.
 Embelia ribes, 163.
 — fluidextract, 163.
 Emery, 247.
 Emetin, 183, 761.
 Emetine, 193, 761.
 Emmenagogue elixir, 627.
 Emollient species, 957.
 Emplastra—Plasters, 628.
 — extensa, 628.
 Emplastrum ad-hesivum, 628.
 — ammoniaci cum hydragryro, 629.
 — belladonnæ, 629.
 — calefaciens, 630.
 — cantharidis, 630.
 — capsici, 630.
 — hydrargyri 630.
 — ichthyocollæ, 631.
 — menthol, 631.
 — opii, 631.
 — picis, 632.
 — plumbi, 632.
 — — iodidum, 633.
 — resinæ, 628.
 — saponis, 633.
 Empyreumatic oil of birch, 842.
 Empyroform, 634.
 Emulsa—Emulsions, 634.
 Emulsification, 635.
 Emulso petroleumi cum hypophosphitibus, 639.
 Emulsin, 125.
 Emulsion almonds, 637.
 — asafetida, 637.
 Emulsion chloroform, 637.
 — cod liver oil, 638, 639.
 — — — and wild cherry, 641.
 — — — — peptonized, 641.
 — — — — with hypophosphites, 638.
 — — — — lactophosphates comp., 640.
 — — — — lime lactophosphate, 640.
 — — — — pancreatin and pepsin, 640.
 — — — — pepsin, 640.
 — — — — yolk of egg, 641.
 — copaiba, 641.
 — oil of turpentine, 639.
 — petroleum, 639.
 — — with hypophosphites, 639.
 Emulsions, general directions, 635.
 Emulsum ammoniaci, 812.
 — amygdalæ, 637, 812.
 — asafetidæ, 637.
 — chloroformi, 637.
 — olei morrhuæ, 638.
 — — — cum hypophosphitibus, 638.
 — — — terebinthinæ, 639.
 — petrolei, 639.
 Enamel, liquid pearl, 1267.
 Endogens, 108.
 Endosmosis, 87.
 English ivy, 178.
 — vinegar, 338.
 Eosolates, 528.
 Eosote, 528.
 Ephredra antisiphilitica, 163.
 — fluidextract, 163.
 Epigæa repens, 163.
 Epilobium angustifolium, 163.
 — fluidextract, 163.
 Epinephrin, 393.
 Epinephrine, 393.
 Epiphegus, 163.
 — fluidextract, 163.
 Epsom salt, 805.
 Equisetum, 163.
 — fluidextract, 163.
 Equivalents, thermometric, 79.
 — weight and measure, 61, 68.
 Erasing fluid for ink, 1292.
 Erasive soap, 1381.
 Erbium (element), 272.
 Erechthites, 164.
 — fluidextract, 164.
 Ergone, 164.
 Ergot, 163.
 — corn, 231.
 — elixir, 580.
 — extract, 654.
 — fluidextract, 164, 231, 691.
 — hypodermic injection, 756.
 — infusion, 754.
 — liquid extract, 692.
 — tincture, ammoniated, 1053.
 — wine, 1117.
 Ergotin, 164, 921.
 — Bonjean's, 164.
 Ergotinic acid, 164.
 Ergotinine, 164.
 Ergotole, 164.
 Erigeron, 164.
 — fluidextract, 164.
 — oil, 164, 838.
 Ericolin, 232.
 Eriodictyon, 164.
 — fluidextract, 164, 692.
 Eryngium, 164.
 — fluidextract, 164.
 Erythromannit, 923.
 Erythronium, 165.
 Erythrophlœum, 165.
 Erythroxyllon elixir, 580.
 — wine, 1123.
 Eschscholtzia, 165.
 Esculetin, 120.
 Esculin, 120.
 Eseridine, 642.
 Eserine, 205, 641, 869.
 — hydrobromide, 641.
 — hydrochloride, 641.
 — pilocarpine, 642.
 — salicylate, 642, 869.
 — sulphate, 642.
 Essence bouquet, sachet, 1310.
 — brandy, 1356.
 — calisaya, 642.
 — coca, 643.
 — de Templine, 115.
 — Jamaica ginger, 643, 1191.
 — — — aromatic, 1192.
 — — rum, 1358.
 — of peppermint, 965.
 — of sarsaparilla, 1000.
 — of spearmint, 966.

- Essence of spruce, 115.
 — pancreatin, 643.
 — pepsin, 643.
 — Roman punch, 1372.
 Essences and Ex-
 tracts, 1191.
 — flavoring,
 1315, 1316, 1328.
 — from essential
 oils, 1206.
 Essentiæ—Essences,
 642.
 Essential oils,
 solutions, 1315.
 Ether, 395.
 — acetic, 394, 396, 644.
 — benzoic, 644.
 — butyric, 394, 479, 644.
 — chloric, 963.
 — — spirit of, 963.
 — commercial, 396.
 — ethylidene-
 diethyl, 328.
 — formic, 394, 397, 644.
 — fortior, 395.
 — hydrobromic, 394, 644.
 — hydriodic, 394, 644.
 — hydrochloric,
 394, 644.
 — nitrous spirit of,
 395, 398, 958.
 — — conc., 398, 957.
 — œnanthic, 395.
 — pelargonic, 395.
 — petroleum, 463, 863.
 — purified, 396.
 — salicylic, 644.
 — sebacic, 395, 644.
 — spirit of, 957.
 — — compound, 957.
 — sulphuric, 395.
 — valerianic, 645.
 — washed, 396.
 Etherate of am-
 monia, 398.
 — camphor, 398.
 — iodine, Magendie, 398.
 — mercury,
 Huffland's, 398.
 — phosphorus, 398.
 — sulphur, 399.
 — turpentine, 399.
 — zinc, 399.
 Etherial oil, 833.
 — tincture lobelia, 1066.
 — — valerian, 1082.
 Etheroles, 398.
 Ethers, ethyl, 394.
 Ethiops of anti-
 mony, 254.
 Ethyl, 644.
 Ethyl acetate, 396, 644.
 — alcohol, 401.
 — benzoate, 644.
 — bromide, 644.
 — butyrate, 479, 644.
 — carbamate, 399, 644.
 — carbamide, 1111.
 — chloride, 399, 644.
 — cinnamate, 134.
 — ethers, 394.
 — formate, 644.
 — hydrate, 401.
 — iodide, 644.
 — morphine, 854.
 — nitrite, 398.
 — — solution, 779.
 — oxide, 395.
 — salicylate, 644.
 — sebacate, 644.
 — urethane, 644.
 — valerate, 645.
 Ethylamine, 645.
 Ethylene, 645.
 — bromide, 645.
 — bichloride, 399.
 Ethylidene, 645.
 Ethylidene-diethyl-
 ether, 328.
 Eucaïne, 645.
 — acetate, 645.
 — lactate, 645.
 Eucalyn, 923.
 Eucalyptol, 165, 645, 838.
 Eucalyptus, 165.
 — balm, 1151.
 — compound, elixir, 580.
 — elixir, 580.
 — fluidextract, 165, 692.
 — gum, 165.
 — oil, 838.
 — ointment, 1100.
 Eudoxin, 1029.
 Eugallol, 911.
 Eugenol, 143, 646.
 Euonymi cortex, 165.
 — extract, 655.
 — — dry, 655.
 — fluidextract, 692.
 Euonymin, 166.
 Euonymus, 165.
 — bark, 165.
 — extract, 165.
 — fluidextract, 165.
 — tincture, 1054.
 Eupatorin, 166.
 Eupatorium, 166.
 — fluidextract, 166, 693.
 — purpureum, 166.
 Euphorbia, 166.
 — corollata, 166.
 — drummondii, 166.
 Euphorbia fluid-
 extract, 166.
 — gum, 166.
 — heterodoxa, 166.
 — ipecacuanha, 166.
 — pilulifera, 166.
 Euphorbium, 166.
 tincture, 1054.
 Eupurpurin, 166.
 Euquinine, 646.
 — hydriodate, 646.
 — salicylate, 646.
 European centaury, 145.
 — silver fir, 115.
 Euophin, 646.
 — di-isobutyl ortho-
 cresol-iodide, 646.
 Europium
 (element), 272.
 Evaporation, 94.
 Evening primrose, 199.
 — fluidextract, 199.
 Exalgine, 647.
 Excelsior inhalant, 1201.
 tonic, 1242.
 Excipient for pills, 873.
 Exodine, 647.
 Exogens, 108.
 Exosmosis, 87.
 Expectorant, 1179.
 — spruce gum, 1183.
 — white pine, 1181.
 Expeller, tape
 worm, 1255.
 Expressed almond
 oil, 825.
 — oil of laurel, 826.
 — — of mustard, 828.
 — — of nutmeg, 826.
 — vegetable oils, 830.
 Expression, 95.
 Exsiccation, 92.
 Extract, alterative, 1141.
 — aloes, 649.
 — arnica root, 650.
 — belladonna,
 alcoholic, 651.
 — — green, 651.
 — — leaves, 650.
 — black cohosh, 652.
 — calabar bean, 661.
 — cascara sagrada, 662.
 — chamomile, 650.
 — cimicifuga, 652.
 — colchicum, 653.
 — — corm, 652.
 — colocynth, 653.
 — — compound, 653.
 — Culver's root, 658.
 — dandelion, 665.
 — digitalis, 654.

Extract ergot, 654.
 — euonymus, 655.
 — — dry, 655.
 — gentian, 655.
 — Goulard's, 789, 790.
 — glycyrrhiza, 656.
 — — pure, 656.
 — hematoxylon, 656.
 — hyoscyamus, 657.
 — — green, 657.
 — Indian cannabis, 651.
 — — hemp, 651.
 — jalap, 657.
 — krameria, 657.
 — leptandra, 658.
 — liquorice, 656.
 — logwood, 656.
 — male fern, 849.
 — malt, 658.
 — nux vomica, 659.
 — opium, 660.
 — physostigma, 661.
 — quassia, 662.
 — rhatany, 657.
 — pinus canadensis, 1192.
 — rhubarb, 663.
 — — compound, 663.
 — scopolia, 663.
 — stramonium, 664.
 — strophanthus, 664.
 — sumbul, 665.
 — taraxacum, 665.
 — Shaker's roots, 1193.
 Extracta—Extracts, 647.
 Extracta duplicia, 328.
 Extraction, 95.
 Extracts bitters, 1366.
 — duplex, 328, 649.
 — eclectic, 920.
 — flavoring,
 1315, 1316, 1328.
 — for perfumes, 1296.
 — from expressed
 juices, 648.
 — general formula
 for, 648.
 — or essences,
 wine, 1363.
 Extractum aloes, 649.
 — anthemidis, 650.
 — arnicæ radicis, 650.
 — belladonnæ
 foliorum, 650.
 — — alcoholicum, 651.
 — — viride, 651.
 — cannabis indicæ, 651.
 — cascariæ sagradæ
 652, 662.
 — — liquidum, 702.
 — cisticifugæ, 652.

Extractum cisticifugæ
 liquidum, 680.
 — cinchonæ
 — — liquidum, 690.
 — cocæ liquidum, 690.
 — colchici, 653.
 — colchici cormi, 652.
 — colocynthidis, 653.
 — — comp., 653.
 — digitalis, 654.
 — ergotæ, 654.
 — euonymi, 655.
 — — siccum, 655.
 — ergotæ liquidum, 692.
 — filicis liquidum,
 393, 693.
 — gentianæ, 656.
 * glycyrrhizæ, 656.
 — — purum, 656.
 — — liquidum, 694.
 — hæmatoxyli, 656.
 — hyoscyami, 657.
 — hamamelidis
 liquidum, 696.
 — hydrastis
 liquidum, 696.
 — hyoscyami viride, 657.
 — ipecacuanhæ
 liquidum, 697.
 — jaborandi
 liquidum, 701.
 — jalapa, 657.
 — kramariæ, 657.
 — leptandræ, 658.
 — malti, 658.
 — nucis vomicæ, 659.
 — — liquidum, 699.
 — opii, 660.
 — opii, liquidum, 699.
 — pareira, 700.
 — physostigmatis, 661.
 — quassia, 662.
 — rhamni
 purshianæ, 662.
 — rhei, 663.
 — rheum comp., 663.
 — sarsæ liquidum, 705.
 — scopolæ, 663.
 — stramonii, 664.
 — strophanthi, 664.
 — sumbul, 655.
 — taraxaci, 655.
 — — liquidum, 708.
 Eye salves, 1194.
 — waters, 1193.

F

Fabæ—Beans, 167.
 Face bleach,
 peerless, 1267.
 — lotion, 1291.

Face powder, bloom
 of Ninon, 1271.
 — — flesh, 1270.
 — — invisible, 1271.
 — — peerless, 1271.
 — — theater, 1271.
 — — white, 1270.
 False bittersweet, 145.
 — — fluidextract, 145.
 — gromwell, 199.
 — — fluidextract, 199.
 — unicorn, 178.
 Fareol, 679.
 Farwell's disinfecting
 solution, 1384.
 Favorite female
 remedy, 1197.
 — rheumatic rem-
 edy, 1031.
 Feet remedies, 1195.
 — tablets, 1196.
 — tender, 1196.
 Fel bovis, 113, 167, 665.
 — — inspissatum,
 167, 666.
 — — purificatum,
 167, 666.
 — — præparatus, 167.
 Female remedy, 1198.
 — pills, 1198.
 Fennel, 168.
 — essence, 1317.
 — fruit, 168.
 — fluidextract, 168, 199.
 — oil, 168, 838.
 — water, 199, 447.
 Fenner's water-bath
 and still, 91.
 Fermentation, 167.
 Fern, maiden-hair,
 syrup, 1019.
 — male, liquid
 extract, 850.
 — — oil of, 850.
 Ferralbumin, 679.
 Ferrapyrine, 680.
 Ferrated cordial
 elixir, 565.
 Feratin, 679.
 Feratose, 679.
 Ferri arsenas, 667.
 — carbonas sacchar-
 atus, 667.
 — chloridum, 668.
 — citras, 668.
 — et ammonii
 citras, 668.
 — — — sulphas, 669.
 — — — tartras, 670.
 — — quininæ citras, 671.
 — — — solubilis, 672.

- Ferri et ammonii strychninae citras, 673.
 — hydroxidum, 673.
 — — cum magnesii oxido, 674.
 — hypophosphis, 674.
 — phosphas, 675.
 — — solubilis, 675.
 — pyrophosphas solubilis, 676.
 — sulphas, 676.
 — — exsiccatus, 677.
 — granulatus, 677.
 Ferric acetate solution, 779.
 — ammonium sulphate, 669.
 — chloride, 668.
 — — solution, 779, 781.
 — — strong, 782.
 — — tincture, 1054.
 — citrate, 668.
 — — solution, 780.
 — hydroxide, 673.
 — — with magnesium oxide, 674.
 — hypophosphite, 674.
 — nitrate solution, 782.
 — persulphate solution, 783.
 — phosphate, soluble, 675.
 — pyrophosphate, soluble, 676.
 — subsulphate solution, 783.
 — sulphate solution, 782, 783.
 Ferrichtol, 679.
 Ferrinol, 679.
 Ferripyrine, 680.
 Ferro-mangan, 680.
 Ferropyrine, 434.
 Ferro-somatose, 680.
 Ferrotanal, 679.
 Ferrous arsenate, 667.
 — carbonate mass, 808.
 — — pills, 880.
 — — saccharated, 667.
 — iodide pills, 881.
 — — syrup, 980.
 — phosphate, 675.
 — — syrup, 990.
 — sulphate, 676.
 — — exsiccated, 677.
 — granulated, 677.
 Ferrum dialysatum, 535.
 Figs, 167.
 Figwort, 220.
 — fluidextract, 220.
 Filter racks, 97.
 Filix mas, 132, 168.
 — — liquid extract, 168.
 Filmogen, 330, 516.
 Filtering gin and liquors, 1357.
 Filters, 96.
 Filtration, 96.
 Fine aniline inks, 1387.
 — orange flower perfume, 1282.
 — pomades, 1283.
 — rose oil perfumes, 1282.
 Fineness of powder, 83.
 Ferrum—Iron, 666, 678.
 — pulveratum, 667.
 — redactum, 678.
 — reductum, 678.
 — tartaratum, 670.
 Fetid spirit of ammonia, 961.
 Feverbush, 189.
 Fever few, 203.
 — — fluidextract, 203.
 — root, 230.
 Fibrin, 122.
 Fibrolusin, 1032.
 Ficus, 167.
 — carica, 167.
 Fig laxative, 1168.
 — — California, 1168.
 Fioravanti spirit, 967.
 Fir, 114.
 — balsam tree, 114.
 — European silver, 115.
 — oil, 115.
 — silver tree, 114.
 — — Oregon, 115, 850.
 Fire-damp, 267.
 Fireweed, 164.
 — fluidextract, 164.
 — oil, 164.
 Fish-berries, 151.
 — glue, 181.
 Five bromides elixir, 555.
 — iodides elixir, 592.
 Fixed oils, 824.
 Flame, color of, 93.
 Flashing point, 93.
 Flavoring elixir, 538.
 — essences and extracts, 1315.
 — for gums, 1354.
 Flaxseed, 190.
 — poultice, 190.
 Fleabane, 164.
 — fluidextract, 164.
 — oil, 164.
 Flesh food, 1268.
 Flexible acetone collodion, 517.
 Flores—Flowers, 168.
 — aurantii, 133.
 Florida flowers cologne, 1309.
 — water, 1309.
 Flour paste, good, 1378.
 Flowers, 111.
 — summit, 111.
 — chamomile, 127.
 — of sulphur, 314, 976.
 Fluidextract alternative comp., 713.
 — aconite, 686.
 — ailanthus, 122.
 — apocynum, 686.
 — aromatic, 687.
 — Bael fruit, 712.
 — belladonna root, 687.
 — berberis, 687.
 — bitter orange peel, 687.
 — blackberry, 704.
 — blackberry comp., 713.
 — black cohosh, 689.
 — black cohosh compound, 713.
 — black haw, 710.
 — blue cohosh compound, 713.
 — bloodroot, 704.
 — boneset, 693.
 — broom, aqueous, 712.
 — buchu, 688.
 — buchu comp., 714.
 — — and pareira brava, 714.
 — — juniper and potassium acetate, 714.
 — buckthorn, 693.
 — burdock, 697.
 — calamus, 688.
 — calumba, 688.
 — cannabis, 688.
 — cardamom comp., 714.
 — cascara sagrada, 702.
 — — — aqueous, 712.
 — — — aromatic, 703.
 — chimiphila, 689.
 — chirata, 689.
 — cimicifuga, 689.
 — cinchona, 689.
 — cinchona comp., 714.
 — — detannated, 716.
 — coca, 690.
 — colchicum seed, 690.
 — colocynth comp., 714.
 — conium, 690.
 — convallaria, 691.
 — couch grass, 709.
 — cramp bark, 710.

- Fluidextract, cubeb, 691.
 — Culver's root, 689.
 — cypripedium, 691.
 — dandelion, 708.
 — — compound, 714.
 — digitalis, 691.
 — ergot, 691.
 — eriodictyon, 692.
 — eucalyptus, 692.
 — euonymus, 693.
 — eupatorium, 693.
 — foxglove, 691.
 — frangula, 693.
 — gelsemium, 693.
 — gentian, 693.
 — gentian comp., 714.
 — geranium, 694.
 — glycyrrhiza, 694.
 — golden seal, 696.
 — — aqueous, 712.
 — ginger, 710.
 — grindelia, 695.
 — guarana, 695.
 — hamamelis, 695.
 — helonias comp., 714.
 — hoarhound comp., 714.
 — hydrastis, 696.
 — hydrastis purified, 716.
 — hyoscyamus, 696.
 — ignatia bean, 716.
 — Indian cannabis, 688.
 — — hemp, 688.
 — ipecac and senega, 714.
 — ipecac, aqueous, 712.
 — ipecacuanha, 697.
 — jaborandi, 700.
 — krameria, 697.
 — ladies' slipper, 691.
 — lappa, 697.
 — leptandra, 698.
 — licorice, 694.
 — liquorice, aqueous, 712.
 — — compound, 714.
 — lily of the valley, 691.
 — lobelia, 698.
 — lupulin, 698.
 — male fern, 693.
 — mandrake, 701.
 — mandrake comp., 714.
 — matico, 698.
 — matico comp., 714.
 — mezereum, 699.
 — mitchella comp., 714.
 — musk root, 708.
 — nux vomica, 699.
 — opium, aqueous, 713.
 — pareira, 700.
 — phytolacca, 700.
 — pink and senna, 715.
- Fluidextract pinus canadensis, colorless, 716.
 — pinus compound, 715.
 — podophyllum, 701.
 — poke root comp., 715.
 — pomegranate, 695.
 — poke root, 700.
 — pilocarpus, 700.
 — pink root, 707.
 — pipsissewa, 689.
 — prickly ash, 710.
 — quassia, 701.
 — queen's root, 707.
 — quercus, 702.
 — quillaja, 702.
 — rhatany, 697.
 — rhubarb, 703.
 — rhubarb, arom., 715.
 — — and senna, 715.
 — rhus glabra, 703.
 — rose, 704.
 — rubus, 704.
 — rumex comp., 715.
 — sanguinaria, 704.
 — sarsaparilla, 704.
 — sarsaparilla compound, 705.
 — sarsaparilla and dandelion, 715.
 — — compound, 715.
 — savin, 704.
 — saw palmetto compound, 715.
 — scopola, 706.
 — scullcap comp., 715.
 — scutellaria, 706.
 — senega, 706.
 — senna, 706.
 — senna comp., 715.
 — serpentaria, 707.
 — skullcap, 706.
 — soap bark, 702.
 — spigelia, 707.
 — spikenard comp., 715.
 — squill, 705.
 — squill comp., 715.
 — staphisagria, 707.
 — stavesacre, 707.
 — stillingia, 707.
 — stillingia comp., 715.
 — stramonium, 708.
 — sumbul, 708.
 — sumach, 703.
 — taraxacum, 708.
 — triticum, 709.
 — uva ursi, 709.
 — valerian, 709.
 — vanilla, 716, 1321.
 — veratrum, 709.
 — viburnum opulus, 710.
- Fluidextract viburnum prunifolium, 710.
 — wild cherry comp., 715.
 — — detannated, 717.
 — xanthoxylum, 710.
 — yerba santa, 692.
 — yerba santa aromatic, 716.
 — wahoo, 692.
 — wild cherry, 701.
 — witch hazel, 695.
 Fluidextracta—
 Fluidextracts, 680.
 Fluidextracts,
 — acetic, 717.
 — aqueous, 711.
 — compound, 711.
 — — other, 716.
 — etherial, 717.
 — general formulas, 684.
 — green plant, 718.
 — manner of making, 681.
 — official, 680.
 — of gums, resins etc., 718.
 — requiring special treatment, 716.
 — unofficial, 710.
 — unofficial are mostly indexed with the name of the drug from which they are prepared.
 Fluidextractum
 — aconiti, 686.
 — apocyni, 686.
 — aromaticum, 687.
 — aurantii amara, 687.
 — belladonnæ radialis, 687.
 — berberidis, 687.
 — buchu, 688.
 — calami, 688.
 — calumbæ, 688.
 — cannabis indicæ, 688.
 — capsici, 688.
 — chimaphilæ, 689.
 — chiratæ, 689.
 — cimicifugæ, 689.
 — cinchonæ, 689.
 — cocæ, 690.
 — colchici seminis, 690.
 — conii, 690.
 — convallariæ, 691.
 — cubebæ, 691.
 — cypripedii, 691.
 — digitalis, 691.
 — ergotæ, 691.
 — eriodictyi, 692.

- Fluidextractum
 eucalypti, 692.
 — euonymi, 692.
 — eupatorii, 693.
 — frangulæ, 693.
 — gelsemii, 693.
 — gentianæ, 693.
 — geranii, 694.
 — glycyrrhizæ, 694.
 — granati, 695.
 — grindeliæ, 695.
 — guaranæ, 695.
 — hamamelidis
 foliorum, 695.
 — hydrastis, 696.
 — hyoscyami, 696.
 — ipecacuanhæ, 697.
 — kramerizæ, 697.
 — lappæ, 697.
 — leptandrzæ, 698.
 — lobeliæ, 698.
 — lupulini, 698.
 — matico, 698.
 — mezeri, 699.
 — nucis vomicæ, 699.
 — pareiræ, 700.
 — phytolaccæ, 700.
 — pilocarpî, 700.
 — podophylli, 701.
 — pruni virginianæ, 701.
 — quassizæ, 701.
 — quercus, 702.
 — quillajæ, 702.
 — rhamni pursh-
 ianæ, 702.
 — — — aromati-
 icum, 703.
 — rhei, 703.
 — rhois glabræ, 703.
 — rosæ, 704.
 — rubi, 704.
 — sabinæ, 704.
 — sanguinariæ, 704.
 — sarsaparillæ, 704.
 — — compositum, 705.
 — scillæ, 705.
 — scopolæ, 706.
 — scutellariæ, 706.
 — senegæ, 706.
 — sennæ, 706.
 — stramonii, 708.
 — sumbul, 708.
 — taraxici, 708.
 — tritici, 709.
 — uva ursi, 709.
 — valerianæ, 709.
 — veratri, 709.
 — viburni opuli, 710.
 — — prunifolii, 710.
 — xanthoxyli, 710.
 — zingiberis, 710.
- Fluid magnesiz, 789.
 — battery, 1398.
 — measure, 64.
 — washing, 1382.
 — disinfecting, 1384.
 — writing, 1389.
 Fluorescein, 920.
 Fluorides, 272, 365.
 Fluorine (element),
 272, 719.
 — compounds, 272.
 Fluor spar, 272.
 Foam, soda, 1332.
 Fœniculi fructus, 168.
 Fœniculum, 168.
 Folia—Leaves, 168, 718.
 Food, chemical, 1017.
 Foot-ease powder, 1195.
 Foot-fetor powder, 1196.
 Foot-powder, anti-
 septic, 1195.
 Foot-sweat powder, 1196.
 Forest flowers
 cologne, 1309.
 Formalbumin, 720.
 Formaldehyde, 719.
 — combinations, 720.
 — gelatin, 720.
 — solution, 720, 784.
 — tannin, 720, 1027.
 Formaldehydlösung, 720.
 Formaldehydum, 719.
 — solution, 720.
 Formalin, 720.
 Formanilid, 720.
 Formates, 356.
 Formatone, 721.
 Formic acid, 355.
 — — spirit, 968.
 Formin, 737.
 Formium, 737.
 Formol, 719.
 Formosal, 721.
 Formopyrine, 721.
 Forms of sulphur, 977.
 Formyl, 356.
 Fosgate's anodyne
 cordial, 1258.
 Fountain pen ink, 1388.
 Four iodides elixir, 592.
 Fousel oil, 409, 426.
 Fowler's solution, 774.
 Foxglove fluidext., 691.
 Fragrant benzine, 1381.
 — cream, 1268.
 — flowers cologne, 1309.
 Frangipanni
 extract, 1299.
 — sachet, 1310.
 Frangula, 169.
 — bark, 169.
- Frangula berries, 169.
 — elixir, 582.
 — fluidextract, 693.
 Frangulin, 169.
 Frankenia, 169.
 Frankincense,
 199, 228, 1028.
 Frappé drinks, 1340.
 Fräsera, 169.
 Fraserin, 169.
 Fraxinus, 169.
 — Americana, 169.
 — excelsior, 169.
 — sambucifolia, 169.
 Freckle lotion,
 1290, 1291.
 Freleigh's rheumatic
 remedy, 1031.
 — tonic, 1243.
 French candy, 1350.
 — chalk, 1025.
 — cologne spirit, 409.
 Fresh herb tinctures,
 1086.
 Fringe tree, 148.
 — — fluidextract, 148.
 Frosticream, 1268.
 Frostwort, 178.
 — fluidextract, 178.
 Frozen fruits, 1348.
 Fructus—Fruits, 169, 721.
 Fructus avenæ, 133.
 — — excorticatus, 133.
 — aurantii im-
 maturi, 133.
 — cuminî, 157.
 Fruit, 111.
 — acid, 355, 1333.
 — angelica, 127.
 — anise, 127.
 — cocktails, 1368.
 — creams, 1348.
 — dill, 127.
 — glaces, 1351.
 — grape syrup, 1336.
 — ices, 1348.
 — juice drinks, 1340.
 — — shakes, 1342.
 — — syrups, 1333.
 — — unfermented, 1330.
 — laxative
 lozenge, 1169.
 — or grape salt, 1234.
 — phosphate syrups,
 1336, 1338.
 — syrup lime, 1336.
 — — lemon, 1336.
 — syrups, con-
 centrated, 1331.
 — tablets or lozen-
 ges, 1025.

Fruits, crushed, 1329.
 — flossed, 1330.
 — oils from, 831.
 Fuchsine, 430.
 Fucus, 170.
 — vesiculosus, 170.
 — — fluidextract, 1223.
 Fudge, 1351.
 Fumaria, 170.
 Fumarine, 170.
 Fumatory, 170.
 — juice, 170.
 Furniture cream, 1394.
 — polish, 1395.
 Fusible metals, 257.
 Fused silver nitrate, 453.
 Fusel oil, 409.
 Fusion, 93.
 Fustic yellow, 519.

G

Gadberry's spleen
 mixture, 1217.
 Gay-Lussac's alcoholometer, 72.
 Gadolin, 273.
 Gadolinium
 (element), 273.
 Gaduol, 820.
 Galactose, 725, 923.
 Galanga, 170.
 Galangal, 170.
 — fluidextract, 170.
 Galbanum, 170.
 — compound pill, 882.
 — gum, 170.
 Galega officinalis, 170.
 Galegol, 170.
 Galium, 170.
 — aparine, 170.
 — verum, 170.
 Gall cure, 1264.
 — ointment, 1100.
 Galls, 171.
 — tincture, 1055.
 Galla, 171.
 Gallal, 421.
 Gallates, 357.
 Gallic acid, 356.
 Gallium (element), 273.
 — combinations, 273.
 Gallotanic acid, 385.
 Galvanized iron, 323.
 Gambir, 721.
 — tincture, 1055.
 — troches, 1091.
 Gamboge comp. pill, 879.
 Garlic, 123, 137.
 — oil, artificial, 415.
 Garrya, 171.
 Garryine, 171.

Gas mantles, 317.
 Gases, atmospheric, 326.
 — densities of, 245.
 Gasoline, 466, 863.
 Gastrosan, 258.
 Gaultheria, 171.
 — fluidextract, 171.
 — oil, 171.
 — spirit, 964.
 Gaultheriline, 838.
 Gaultherio-salicylic
 acid, 838, 925.
 Gauze, boric acid, 722.
 — carbolized, 722.
 — corrosive subli-
 mate, 722.
 — iodoform, 722.
 — salicylated, 722.
 — salol, 722.
 Gauzes, 722.
 — prepared, 722.
 Gay feather, 189.
 Gelatin, 723.
 — glycerinated, 723.
 Gelatinum, 113, 723.
 — glycerinatum, 723.
 Gelose, 121.
 Gelsemic acid, 171.
 Gelsemii radix, 171.
 Gelsemin, 171.
 Gelseminine, 171.
 — hydrochloride, 171.
 — sulphate, 171.
 Gelsemium, 171.
 — elixir, 582.
 — fluidextract, 171, 693.
 — root, 171.
 — tincture, 171, 1056.
 Genepi, 130.
 Gentian, 172.
 — and iron elixirs, 583.
 — comp. tincture, 1056.
 — — improved, 1057.
 — cordial, 525.
 — elixir, 582.
 — extract, 655.
 — fluidextract, 172, 693.
 — infusion, comp., 754.
 — — concentrated, 754.
 — root, 172.
 Gentiana, 172.
 Gentianæ radix, 172.
 Gentianin, 172.
 Gentianose, 172.
 Gentiopicroin, 172.
 Gentisin, 172.
 Gentisein, 172.
 Geosote, 735.
 Geraniin, 172.
 Geranium, 172.
 — fluidextract, 172, 694.

German chamomile, 194.
 — fluidextract, 194.
 — cologne, 1308.
 — — Hoyt's, 1308.
 — corn cure, 516.
 — liver bitters, 1159.
 — silver, 271.
 — tonic, 1243.
 Germanium
 (element), 272.
 — compounds, 273.
 Geum, 172.
 — rivale, 172.
 — urbanum, 172.
 Gillenia, 172.
 — stipulaceæ, 172.
 — trifoliata, 172.
 Gillenin, 172.
 Gin, 1356.
 — cocktail, 1368.
 — Holland, 1357.
 — London cordial, 1357.
 — Old Tom, 1357.
 — to clarify, 1357.
 Ginger, African, 236.
 — essence, 236.
 — Jamaica, 236.
 — — extract, 1191, 1319.
 — — — aromatic, 1191
 — oil, 236.
 Ginger ale, 1326.
 — — extract, 1326.
 — — syrup, 1335.
 — carminative, 1163.
 — elixir, 586.
 — essence, 1085.
 — fluidextract, 710.
 — stronger
 tincture, 1085.
 — syrup, 1004, 1335.
 — tincture, 1084.
 — tonic, 1243.
 Ginseng, 202.
 — fluidextract, 202.
 Glaces, fruit, 1351.
 Glandulæ, 113.
 — suprarenales
 siccæ, 172.
 Glass, 305.
 — and silver
 polish, 1395.
 — of antimony, 254.
 — to metal cement, 1374.
 — polish, 1395.
 Glauber's salt, 311, 943.
 Glechoma, 173.
 — fluidextract, 173.
 Glonoin, spirit of, 964.
 Glove cleaner, 1381.
 Glucinum
 (element), 257, 273.

- Glucose, 126, 724.
 — syrup, 991.
 Glucoses, 921, 923.
 Glucosides, 725.
 Glucosimide, 723.
 Glue, 723.
 — fish, 181.
 — for rubber, 1374.
 — liquid, 1375.
 — — French, 1376.
 — — padding, 1377.
 — mouth or elastic, 1376.
 — ordinary, 1375.
 — pad, 1376.
 — water-proof, 1376.
 Glues, 1375.
 Gluside, 723.
 — elixir, 586.
 — solution, 955.
 Glusidum, 723, 924.
 Glutina cement, 1373.
 Glutol, 720.
 Glycerin, 725.
 — alum, 729.
 — borax, 730.
 — lead subacetate, 731.
 — cream, 1269.
 — honey, 1289.
 — — carbolated, 1289.
 — ice, 1289.
 — jelly, 1289.
 — lotions, 1291.
 — mineral, 726.
 — — nitro, 726.
 — of boric acid, 728.
 — pepsin, 731.
 — phenol, 731.
 — solidified, 1289.
 — suppositories, 981.
 — tannic acid, 729.
 — tragacanth, 731.
 Glycerinated gelatin, 723.
 Glycerinophosphate
 calcium, 727.
 — other salts of, 727.
 — strychnine, 972.
 Glycerino-
 phosphates, 727.
 — comp. elixir, 727.
 — lime and soda
 elixir, 587.
 — mixtures, 727.
 — solutions, 727.
 — syrups, 727.
 — — compound, 1007.
 Glycerinophosphoric
 acid, 357.
 Glycerinum, 113, 725.
 — acidi borici, 728.
 — — carbolic, 731.
 — — tannici, 729.
 Glycerinum aluminis, 729.
 — amyli, 729.
 — boracis, 730.
 — pepsini, 731.
 — plumbi sub-
 acetatis, 731.
 — tragacanthæ, 731.
 Glycerita, 728.
 Glycerite, arnica, 732.
 — bismuth, 732.
 — boro-glycerin, 729.
 — calendula, 732.
 — of glyceryl
 borate, 729.
 — of hydrastis, 730.
 — iodine, 732.
 — — carbolate, 732.
 — phenol, 731.
 — starch, 729.
 — tannic acid, 729.
 — tar, 732.
 — — compound, 733.
 — thiol, 1031.
 — yerba santa, 733.
 Glycerites, 728.
 — of phosphates of iron,
 quinine and
 strychnine, 730.
 Glyceritum acidi
 tannici, 729.
 — amyli, 729.
 — boroglycerini, 729.
 — ferri, quininae et
 strych. phos., 730.
 — hydrastis, 730.
 — phenolis, 731.
 — vitelli, 732.
 Glycerol, 725.
 Glyceryl trinitrate,
 spirit, 964.
 Glycoleum, 726, 862.
 Glyconin, 234, 732.
 Glycosine, 724.
 Glymol, 726, 862.
 Glycyrrhiza, 173.
 — aromatic elixir, 601.
 — and opium
 troches, 1091.
 — comp. elixir, 601.
 — comp. mixture, 814.
 — comp. powder, 906.
 — comp. syrup, 1021.
 — elixir, 601.
 — extract, 656.
 — — pure, 656.
 — fluidextract, 694.
 — radix, 173.
 Glycyrrhizin, 174.
 — ammoniated, 174.
 Glycyrrhizinum am-
 moniatum, 174, 733.
 Gnaphalium, 174.
 Gnoscopine, 854.
 Goa powder, 129, 149.
 Goat's rue, 170.
 — fluidextract, 170.
 Gold, 460.
 — (element), 273.
 — alloys, 274.
 — amalgam, 274.
 — and silver inks, 1392.
 — and sodium
 chloride, 460.
 — chlorides, 274.
 — compounds, 273.
 — cure, hypo-
 dermic, 1215.
 — — tonic, 1215.
 — cures, 460, 1214.
 — elixir, 627.
 — leaf, 273, 460.
 — methods of sep-
 arating, 273.
 — oxides, 274.
 — plating, 274.
 — — solution, 1399.
 — thread, 154.
 Golden anodyne
 tincture, 1144.
 — drops, Dr. De la
 Motte's, 627.
 — emulsion, 1199.
 — ointment, 1226.
 — injection, 1199.
 — rod, 224.
 — — fluidextract, 224.
 — — oil, 224.
 — seal, 180, 746.
 — fluidextract, 180, 696.
 — — elixir, 590.
 — — tincture, 1059.
 Gombault's caustic
 balsam, 1153.
 Gonorrhœa cures, 1199.
 Gorit, 264.
 Gossypii cortex, 174.
 Gossypium, 174, 733.
 — purification, 174, 733.
 Gout elixir, 626.
 — mixture,
 Laville's, 1217.
 Government harness
 dressing, 1394.
 Gouania, 174.
 — fluidextract, 174.
 — Goulard's
 extract, 789, 790.
 — solution, 790.
 — water, 790.
 Granati cortex, 174.
 Granatose, 724.
 Granatum, 174.

Granulated opium, 853.
 Granulation, 97.
 Granular salts, 97.
 Grape fruit syrup, 1336.
 — juice punch, 1345.
 — phosp. syrup, 1336.
 — salt, 1234.
 — sugar, 126, 724, 923.
 — syrup, 1335.
 — concentrated, 1331.
 Gratiola, 175.
 — fluidextract, 175.
 Gravity, specific, 70.
 — of solids, 73.
 — of liquids, 73.
 Grease extractor,
 peerless, 1382.
 — remover, Im-
 perial, 1381.
 Green aniline, 430.
 — bladder, 519.
 — chlorophyl, 519.
 — Chartreuse, 1370.
 — grass, 518.
 — iodide of mer-
 cury, 742.
 — plant fluid-
 extracts, 1086.
 — sap, 519.
 — soap, 929.
 Gregory's powder, 908.
 Griffith's mixture, 814.
 Grindelia, 175.
 — fluidextract, 175.
 — robusta elixir, 588.
 Gromwell, false, 199.
 — fluidextract, 199.
 Ground cherry, 205.
 — ivy, 173.
 — fluidextract, 173.
 Guaco leaves, 196.
 — fluidextract, 196.
 — root, 175.
 — fluidextract, 175.
 Guaiac, 176, 919.
 — ammoniated
 tincture, 1058.
 — tincture,
 Dewee's, 1058.
 — tincture, 1057.
 — — alkaline, 176, 919.
 Guaiacene, 176, 919.
 Guaiaci lignum, 175.
 — resina, 175, 919.
 Guaiacic acid, 176, 919.
 Guaiacol,
 176, 734, 888, 919.
 — biniodide, 735.
 — carbonate, 735.
 — phosphite, 735.
 — salol, 735.

Guaiacol sulphonate of
 potassium, 1030.
 — valerate, 735.
 Guaiacolis carbonas, 735.
 Guaiacophosphal, 735.
 Guaiacum, 919.
 — mixture, 815.
 — resin lozenge, 1091.
 — wood, 175.
 — fluidextract, 176.
 — resin, 176, 919.
 Guaiaperol, 886.
 Guaiaretic acid, 176.
 Guarana, 176, 735.
 — and celery elixir, 588.
 — elixir, 588.
 — fluidextract, 176, 695.
 Guaranine, 176, 481, 736.
 Gum, acacia, 117.
 — Arabic, 117.
 — artificial, 534.
 — British, 534.
 — chicle, 1353.
 — euphorbium, 166.
 — galbanum, 170.
 — gedda, 117.
 — hemlock, 115, 887.
 — mastic, 919.
 — myrrh, 197.
 — sagepenum, 216.
 — senegal, 117.
 — sweet, 134, 190.
 — tuno, 1353.
 — thus, 135.
 — turpentine, 851.
 — Zapota, 1353.
 Gummi Gutta, 139.
 Gums and Gum-
 Resins, 111.
 Gums, chewing, 1353.
 Gun cotton, 292.
 — soluble, 911.
 — metal, 271.
 Gurjun balsam, 852.
 Gutta-percha, 176.
 Gynocardia odorata, 176.
 Gypsum, 264.

H

Hæmatoxylin, 177.
 Hæmatoxylon, 177.
 Hair balsam, 1284.
 — dye, bismuth, 1279.
 — — black, 1279.
 — — brown, 1278.
 — — vanadium, 1279.
 — dyes, 1278.
 — food, 1288.
 — gloss, 1281.
 — grower, bay, 1280.
 — — carbolic, 1280.

Hair grower
 pomade, 1280.
 — growers, 1280.
 — lotion, almond, 1280.
 — — bay, 1281.
 — — or wash, 1287.
 — — rose, 1281.
 — — stimulating, 1281.
 — lotions, 1280.
 — oil bases, 1281.
 — — colorings, 1281.
 — — perfumes, 1282.
 — — walnut, 1282.
 — oils, 1281.
 — pomades, 1282.
 — powders, 1284.
 — renewers, 1284.
 — renovator, 1285.
 — restoratives, 1284.
 — restorer, 1285.
 — — Mrs. Allen's, 1286.
 — tonic, 1287.
 — — Imperial, 1288.
 — — Peerless, 1288.
 — vigor, 1285.
 — vitalizer, 1285.
 — water, peerless, 1279.
 Hair-cap moss, 208.
 — fluidextract, 208.
 Hale's honey of hoar-
 hound and tar, 1180.
 Haller's acid drops, 381.
 — elixir, 381.
 Halogen elements, 261.
 Halogens, 758.
 Hamamelidis folia, 177.
 — cortex, 177.
 Hamamelis, 177.
 — bark, 177.
 — fluidextract, 695.
 — leaves, 177.
 — liquid extract, 696.
 — solution, 785.
 — tincture, 1058.
 — water, 447.
 Hamatoxyli lignum,
 177.
 Hamburg tea, 1182, 1230.
 Hamburger drops, 1257.
 Hard soap, 929.
 Harlem oil, 846.
 Harness dressing,
 government, 1394.
 Harter's wild cherry
 bitters, 1244.
 Hart's horn, 155, 423.
 Haw. black, 234.
 Hawkweed, 179.
 — syrup, 179.
 Hayden's viburnum
 compound, 1250.

- Hay fever nebulizing liquid, 1218.
 — — remedies, 1148, 1199.
 Headache powders, 1200.
 — — remedies, 1200.
 Healing balsam, vegetable, 1154.
 — ointment, 1226.
 Health cordial, tonic, 1157.
 — elixir, 627.
 — restorative, women's, 1198.
 Heart corrector, 1200.
 — preparations, 1200.
 — regulator, 1200.
 Hearts-ease, 234.
 Heat, defined, 77.
 — latent, 80.
 — specific, 80.
 — equivalents, 79.
 — measures, 77.
 — red and white, 93.
 — unit, 78.
 Heave powders, 1262.
 Heavy calcined magnesia, 803.
 — magnesia, 803, 804.
 — magnesium carbonate, 803.
 — — oxide, 803, 804.
 Hedeoma, 177.
 Hedera helix, 178.
 Hederine, 178.
 Hedge hyssop, 175.
 — — fluidextract, 175.
 Hedonal, 736.
 Helenin, 182.
 Helianthella, 178.
 — fluidextract, 178.
 Helianthemum, 178.
 Helianthus, 178.
 Heliotrope perfume, 1304.
 — sachet, 1310.
 Heliotropin, 1301.
 — crystals solution, 1303.
 — solution, 1303.
 Helium (element), 275.
 Hellebore, 178.
 — American, 233.
 — black, 178.
 — fluidextract, 178.
 — white, 178.
 Helleborein, 178.
 Helleborus, 178.
 — alba, 178.
 Helonias, 178.
 — fluidextract, 178.
 Helonias comp. elixir, 588.
 Helonin, 178.
 Hema-hemi-hemo- 736.
 Hématin, 177.
 — albumin, 736.
 Hematoxylon extract, 656.
 Hemidesmi radix, 178.
 Hemidesmus root, 178.
 — syrup, 991.
 Hemisine, 393.
 Hemitol, 737.
 Hemlock (conium), 153.
 Hemlock spruce, 115.
 — essence, 1317.
 — gum, 115, 887.
 — juice, 973.
 — oil, 115.
 — pitch, 887.
 — tincture, 1052.
 — water, 154.
 Hemogallol, 736.
 Hemoglobin, 736.
 Hemol, 736.
 — arsenated, 736.
 — bromide, 736.
 — cuprated, 736.
 — iodized, 736.
 Hemostatin, 393.
 Hemp, Canadian, 128.
 — Indian, tincture, 1043.
 Henbane, 180.
 — fluidextract, 180.
 — elixir, 591.
 — juice, 973.
 — leaves, 750.
 Henry's magnesia, 803.
 Hepar, 978.
 — sulphur, 314.
 — sulphuris, 978.
 Hepatic salt, 1235.
 Hepatica, 179.
 — fluidextract, 179.
 Heracleum, 179.
 — fluidextract, 179.
 Herbæ—Herbs, 179, 737.
 Herbs, 111.
 — fresh, tinctures, 1085.
 Heroin, 737, 819, 854.
 — and terpin hydrate elixir, 589.
 — comp. elixir, 589.
 — — syrup, 1007.
 — elixir, 589.
 — hydrochloride, 737.
 — Pure Food and Drugs Law, 737.
 Hetralin, 737.
 Heuchera, 178.
 — fluidextract, 179.
 Hoang-nan, 179.
 — tincture, 179, 1080.
 Hoarhound, 193.
 — and tar syrup, 1179.
 — comp. syrup, 1022.
 — fluidextract, 193.
 Hoffman's anodyne, 959.
 Hoffmann's visceral elixir, 604.
 Hoffmannscher lebens balsam, 1217.
 Hog cholera powder, 1262.
 Holocaine hydrochloride, 738.
 Holloway's pills, 1258.
 Holly, 181.
 — fluidextract, 181.
 Homatropine, discs of, 766.
 — hydrobromide, 738.
 — sulphate, 738.
 — salicylate, 738.
 Homatropinæ hydrobromidum, 738.
 Homœopathic medicines, 1133.
 — solutions, 1134.
 — tinctures, 1133.
 — triturations, 1135.
 Honduras bark, 143.
 Honey, 194, 809.
 — borax, 810.
 — clarified, 810.
 — compound spirit, 968.
 — cough, 1177.
 — of hoarhound and tar, 1179.
 — of rose, 810.
 Honeys, 809.
 Hoof ointment, 1264.
 Hope's camphor mixture, 1216.
 Hop bitters, 1156.
 Hops, 179.
 — fluidextract, 180.
 — infusion, 754.
 — or humulus elixir, 589.
 — tincture, 1066.
 Horse brimstone, 314, 978.
 — chestnut, 120.
 Horsemint, 196.
 — oil, 196.
 Horseradish, 129.
 — comp. spirit, 962.
 Horsetail, 163.
 Horticultural inks, 1392.
 Hospital quinine, 915.
 — specific, 1240.
 Hot egg phosphate, 1344.

- Hot lemonade, 1344.
 — soda drinks, 1344.
 Hound's tongue, 158.
 — — fluidextract, 158.
 Household ammonia, 1381.
 Hevea, 141.
 — varieties, 162.
 Hexamethylamina, 737.
 Hexamethylenamine, 737.
 Hexamethylenetramine-tannin, 1027.
 Hexamine, 737.
 Hexane, 463.
 Hickory, 143.
 — fluidextract, 143.
 — extract, 143.
 — nut oil, 143.
 — nut candy, 1351.
 Hieracium, 179.
 — syrup, 179.
 High wines, 403.
 Hips, confection, 521.
 Hirudo, 179.
 Hirudo, the leech, 113.
 Hive syrup, 1000.
 Huiles volatiles, 833.
 Humulus, 179.
 Hungarian balsam, 852.
 — turpentine, 852.
 Hunn's life drops, 1209.
 Hunyadi Janos water, 1346.
 Husband's
 magnesia, 803.
 Huxham's tincture, 1049.
 Hy, 750.
 Hyacinth perfume, 1305.
 Hyacinthol, 1301.
 — solution, 1303.
 Hydracetin, 342.
 Hydracids, 276, 748.
 Hydramides, 411.
 Hydrangea, 180.
 — fluidextract, 180.
 — and lithium comp.
 elixir, 590.
 — elixir, 590.
 Hydrargyri chloridum corrosivum, 740.
 — cyanidum, 741.
 — iodidum flavum, 742.
 — — rubrum, 743.
 — oleas, 743.
 — oxidum flavum, 744.
 — — rubrum, 744.
 — perchloridum, 740.
 — subchloridum, 741.
 Hydrargyrum ammoniatum, 739.
 — cum creta, 739.
 Hydrastin, 467, 746.
 Hydrastina, 745.
 Hydrastinae hydrochloridum, 746.
 Hydrastine, 180, 745.
 — hydrochloride, 746.
 — solution, colorless, 1250.
 — sulphate, 746.
 Hydrastinine hydrochloride, 746.
 Hydrastis, 180, 746.
 — Canadensis, 746.
 — elixir, 590.
 — fluid, 180.
 — fluidextract, 180, 696.
 — glycerite, 730.
 — iron and bismuth elixir, 591.
 — liquid extract, 180, 696.
 — rhizome, 180, 746.
 — tincture, 1059.
 Hydrated alumina, 420.
 — chloral, 500.
 — — elixir, 573.
 Hydrazine, 292, 746.
 Hydrazoic acid, 292.
 Hydric formate, 356.
 Hydrides, 275.
 Hydriodic acid, 277, 357, 759.
 — — conc., 358.
 — — syrup, 985.
 — ether, 644.
 Hydroacids, 747.
 Hydrobromic acid, 359.
 — — conc., 359.
 — — diluted, 360.
 — — gasiforme, 359.
 — ether, 644.
 Hydrocarbons, 747, 831.
 Hydrochinonum, 748.
 Hydrochlorates, 362.
 Hydrochloric acid, 361.
 — ether, 644.
 Hydrochlorides, 362.
 Hydrocotarine, 854.
 Hydrocyanic acid, 531.
 — — diluted, 531.
 Hydrofluoric acid, 273, 365.
 — — diluted, 366.
 Hydrogen,
 (element), 275.
 — borate, 349.
 — citrate, 355.
 — compounds, 275.
 Hydrogen dioxide, 747.
 — — solution, 447.
 — fluoride, 273, 365.
 — gas, 275.
 — liquid, 275.
 — iodide, 277.
 — oxide, 276.
 — peroxide, 276, 747.
 — — solution, 447, 785.
 — solid, 275.
 — sulphide, 314.
 Hydrogenum—Hydrogen, 747.
 Hydrolats, 439.
 Hydrometers, 71.
 Hydrometry, 71.
 Hydroquinone, 748.
 Hydrostatic balance, 72.
 Hydrosulphuric acid, 387.
 Hydrous wool fat, 393.
 Hydroxides, 276, 748.
 Hydroxyl, 276.
 Hygrine, 151.
 Hygrometers, 247.
 Hygrometry, 247.
 Hyoscinae hydrobromidum, 748.
 Hyoscyne, 748, 930.
 — hydrobromide, 748.
 — hydrochloride, 748.
 — hydriodide, 748.
 — sulphate, 748.
 Hyoscyami folia, 180, 750.
 Hyoscyaminae hydrobromidum, 749.
 — sulphas, 749.
 Hyoscyamine, 749.
 — hydrochloride, 749.
 — hydriodide, 749.
 — sulphate, 749.
 Hyoscyamus, 180, 750.
 — elixir, 591.
 — extract, 657.
 — — green, 657.
 — fluidextract, 181, 696.
 — leaves, 180, 750.
 — juice, 657.
 — oil, 181.
 — tincture, 973.
 Hypericum, 181.
 — fluidextract, 181.
 Hyperidal, "606." 750.
 Hypnal, 434.
 Hypnon, Hypnone, 331.
 Hypnotic, Sylvia's, 1145.
 Hypnotics, 1145.
 — and sedatives, 1219.
 Hypo-bromic compound, 1145.

Hypodermic injection
 apomorphine, 755.
 — cocaine, 756.
 — curare, 756.
 — ergot, 756.
 — morphine, 756.
 — injections, 755.
 — tablets, 1025.
 Hypophosphites, 297, 366.
 — compounds, 1201.
 — elixir, 591.
 — solution, 786.
 — syrup, 992.
 — syrups,
 992, 1008, 1011.
 Hypophosphorous
 acid, 366, 868.
 — diluted, 366.
 Hyssop, 181.
 — fluidextract, 181.
 — oil, 181.
 — wild, 234.
 — fluidextract, 234.
 Hyssopus, 181.
 — fluidextract, 181.

I

Ibit, 259.
 Ice, 322.
 — camphor, 1225.
 — cream and ices, 1347.
 — cream soda, 1341.
 — glycerin, 1289.
 — lemon, 1348.
 — orange, 1348.
 — pineapple, 1348.
 Ices and jellies,
 toilet, 1288.
 — fruit, 1348.
 Iceland moss, 147.
 — comp. syrup, 1021.
 Ichthyocolla, 113, 181.
 Ichthyol, 750.
 — (ammonium), 252.
 — sulphonate, 750.
 Ichthyolidin, 886.
 Ignatia, 181.
 — fluidextract, 181.
 Ignition, 93.
 Ilang-ilang
 essence, 1296.
 — extract, 1298.
 Ilex, 181.
 — fluidextract, 181.
 — Paraguavensis, 182.
 Illicium, 182.
 Illuminating oil, 863.
 Imperatoria, 182.
 Imperial cloth and
 glove cleaner, 1381.
 — face bleach, 1266.

Imperial grease
 remover, 1381.
 — greaseless massage
 paste, 1293.
 — lotion, 1291.
 — moth and freckle
 lotion, 1291.
 — pimple lotion, 1292.
 — tooth cream, 1273.
 — tooth powder, 1275.
 — tooth wash, 1273.
 — vanishing
 cream, 1269.
 — weight and
 measure, 59.
 — fluid measures, 65.
 — equivalents, 66.
 Incineration, 94.
 Incandescence, 93.
 India-rubber, 141, 162.
 — solution, 777.
 Indian arrow poison, 157.
 — azadirach, 133.
 — Bael, 135.
 — cannabis extract, 651.
 — fluidextract, 688.
 — tincture, 1043.
 — hemp, 141.
 — hemp extract, 651.
 — tincture, 1043.
 — tincture, 143.
 — liniment, 1209.
 — myrrha, 135.
 — physic, 172.
 — fluidextract, 172.
 — sarsaparilla, 178.
 — fluidextract, 178.
 — syrup, 991.
 — tobacco, 190.
 — turnip, 130.
 Indigo, 182.
 — wild, 135.
 — fluidextract, 135.
 Indium (element), 276.
 — compounds, 276.
 Industrial alcohol, 407.
 Infants and invalids
 food, 1386.
 Influenza remedies, 1264.
 Infusa—Infusions, 751.
 Infusion, 97.
 — of bearberry, 754.
 — broom, 754.
 — cascarrilla, 753.
 — chirata, 753.
 — cinchona acid, 753.
 — cloves, 753.
 — columba, 753.
 — cusparia, 753.
 — digitalis, 752, 753.
 — digitalis conc., 755.

Infusion ergot, 754.
 — gentian comp., 754.
 — gentian conc., 755.
 — hops, 754.
 — jequirity, 116.
 — krameria, 754.
 — orange, 753.
 — compound, 753.
 — quassia, 754.
 — rhubarb, 754.
 — roses, 754.
 — senega, 754.
 — senna, 754.
 — senna comp., 752.
 — serpentaria, 754.
 — uva ursi, 754.
 — wild cherry, 752.
 Infusions, 751.
 — general formula
 for, 751.
 Infusum aurantii, 753.
 — compositum, 753.
 — buchu, 753.
 — calumbæ, 753.
 — caryophylli, 753.
 — cascarrilla, 753.
 — chiratæ, 753.
 — cinchonæ acidum, 753.
 — cuspariæ, 753.
 — digitalis, 752, 753.
 — digitalis conc., 755.
 — ergotæ, 754.
 — gentianæ comp., 754.
 — gentianæ conc., 755.
 — krameria, 754.
 — lupuli, 754.
 — pruni virginianæ, 752.
 — quassia, 754.
 — rhei, 754.
 — rosæ acidum, 754.
 — scoparii, 754.
 — senegæ, 754.
 — sennæ, 754.
 — sennæ comp., 752.
 — serpentaria, 754.
 — uva ursi, 754.
 Inhalant iodine
 carbolate, 1201.
 — excelsior, 1201.
 — lightning, 1202.
 Inhalants and in-
 halers, 1201.
 Injectio apomorphinæ
 hypodermica, 755.
 — cocaine hypoder., 756.
 — curaræ hypoder., 756.
 — ergotæ hypoder., 756.
 — hypodermica, 755.
 — morphinæ hypo., 756.
 Injection brou. 1202.
 — golden, 1199.

- Injection hydrastis compound, 1203.
 — rose, 1202.
 Injections, 1202.
 Ink erasing fluid, 1392.
 — fountain pen, 1388.
 — powders, 1391.
 Inks, 1387-1392.
 —, Bluings and Blackings, 1387.
 — gold and silver, 1392.
 — hectograph, 1390.
 — horticultural, 1392.
 — indellible, 1390.
 — marking, 1391.
 — stamping, 1391.
 — writing, 1387-1390.
 Inosit, 923.
 Insect flowers, 210.
 Inspissated juices, 648.
 Inula, 182.
 Inulin, 182.
 Invisible face powder, 1271.
 Iodal, 411.
 Iodalbin, 759.
 Iodantipyrine, 759.
 Iodates, 277, 758.
 Iodia, 1203.
 Iodic acid, 277, 358.
 Iodide alteratives, 1203.
 — of lime syrup, 1011.
 — of manganese syrup, 1012.
 — of starch syrup, 1012.
 — potassium elixir compound, 1203.
 — sulphur, 977.
 — thymol, 1032.
 Iodides, 277, 758.
 — elixirs, 591.
 Iodinal collodion, 516.
 Iodine, 758.
 — (element), 276.
 — acids of, 276, 759.
 — bromide, 277, 759.
 — carbolate
 inhalant, 1201.
 — — glycerite, 732.
 — chloride, 277, 759.
 — comp. solution, 786.
 — compounds, 276, 759.
 — cyanide, 277, 759.
 — etherate, 398.
 — glycerite, 732.
 — ointment, 1104.
 — solution, strong, 786.
 — tincture, 1060.
 — — decolorized, 1061.
 — trichloride, 277, 759.
 Iodipin, 759.
 Iodized cod liver oil, 1223.
 Iodo-bromide calcium compound, 1204.
 Iodo-caffeine, 760.
 Iodo-caseine, 757.
 Iodo-ferrated cod liver oil, 1224.
 Iodo-phenine, 760.
 Iodoform, 756.
 — collodion, 516.
 — ointment, 1105.
 — suppositories, 982.
 — substitutes, 757.
 Iodoformum, 756.
 Iodo-hemol, 736.
 Iodol, 758, 760.
 — caffeine, 757.
 Iodolum, 760.
 Iodomuth, 758.
 Iodophen, 1029.
 Iodopyrine, 434, 759.
 Iodothyryne, 760.
 Iodum, 758.
 Ionone, 1301.
 — solution, 1303.
 Ipecac, 183, 760.
 — and opium comp.
 syrup, 1022.
 — — elixir, 592.
 — — powder, 907.
 — — tincture, 1061.
 — elixir, 592.
 — fluidextract, 183, 697.
 — liquid extract, 183.
 — syrup, 993.
 — tincture, 1061.
 — troches, 1091.
 — wild, 166.
 — with squill pill, 882.
 Ipecacuanha, 183, 760.
 — comp. powder, 907.
 — fluidextract, 183.
 — liquid extract, 183.
 — root, 183.
 — vinegar, 339.
 Ipecacuanhæ radix, 183, 760.
 Ipecacuanhic acid, 183.
 Iridin, 183.
 Iridium (element), 277.
 — compounds, 277.
 — chlorides, 278.
 — oxides, 278.
 Iris, 183.
 — florentina, 183.
 — versicolor, 183.
 — — fluidextract, 183.
 Irish moss, 148.
 Iron, 666.
 — (element), 278.
 Iron acetate tinct., 1054.
 — albuminate, 679.
 — — solution, 679.
 — and ammonium acetate solution, 781.
 — and ammonium citrate, 668.
 — — sulphate, 669.
 — — tartrate, 670.
 — and calcium hypophos. syrup, 1009.
 — — lactophosphates, 1015.
 — and cinchona wine, 1123.
 — arsenate, 667.
 — bitter wine of, 1118, 1122.
 — bitters, 1157.
 — bromide elixir, 593.
 — — syrup, 1005.
 — carbonate, 667.
 — — saccharated, 667.
 — chloride, 668.
 — — and arsenic elixir, 593.
 — — elixir, 593.
 — — syrup, 1007.
 — — tincture, (citrochloride), 949.
 — citrate, 668.
 — — and quinine elixir, 594.
 — — — syrup, 1008.
 — — and strychnine syrup, 1008.
 — — elixir, 593.
 — — quinine and strychnine, 672.
 — — — elixir, 594.
 — — — syrup, 1008.
 — — soluble, 668.
 — — syrup, 1008.
 — — wine of, 1118.
 — compounds, 278.
 — conium mixture, Tully's, 1217.
 — — dialysed, 535.
 — — in scales, 535.
 — — syrup, 1008.
 — forms of, 278.
 — galvanized, 323.
 — glycerinophosphate, 679.
 — hydrated oxide, 673.
 — hypophosphite, 674.
 — — elixir, 594.
 — — solution, 950.
 — — syrup, 1009.
 — iodide elixir, tasteless, 594.

Iron iodide syrup,
tasteless, 1011.
— lactate and pepsin
elixir, 594.
— — elixir, 594.
— — syrup, 1013.
— lactophosphate
solution, 950.
— — syrup, 1014.
— manganese iodides
syrup, 1012.
— — hypo. syrup, 1010.
— mixture comp., 814.
— muriate elixir, 593.
— — tincture, 1054.
— nucleide, 679.
— oxide syrup, 990.
— peptonate, 679.
— peptonized, 679.
— phosphate, 675.
— — elixir, 595.
— — soluble, 675.
— — syrup, 1016.
— — and quinine
elixir, 595.
— — quinine and strychnine
elixir, 595.
— — solution, 950.
— pill, 880.
— potassium tartrate,
670.
— powdered, 667.
— protoxide sol., 953
— — syrup, 1018.
— pyrophosphate
elixir, 595.
— — soluble, 676.
— — solution, 951.
— — syrup, 1018.
— — and quinine
elixir, 596.
— — — neutral,
elixir, 596.
— — — and arsenic,
elixir, 597.
— — — strychnine
elixir, 597.
— — — — neutral, 597.
— quinine and strychnine
citrate, 672.
— — — elixir, 597.
— — — hypophosphates
syrup, 1011.
— — — phosphates
syrup, 990.
— quinine citrate, 781.
— — — soluble, 672.
— reduced, 673.
— salts of, general, 279.
— sodium albuminate
syrup, 1012.

Iron soluble citrate, 679.
— strychnine citrate, 673.
— — — elixir, 598.
— succinate, 679.
— sulphate, 676.
— — dried, 677.
— — granulated, 677.
— tartarated, 678.
— tonic, 1244.
— valerianate elixir, 598.
— water, 1346.
— wine bitters, 1158.
— wine of, 1117, 1124.
— wood, 201.
— — fluidextract, 201.
Isinglass, 113, 181.
— (Ichthyocollo),
113, 181.
— plaster, 631.
Iso amyl benzene, 464.
Iso butyl benzene, 464.
Isodulcit, 923.
Isonandra gutta, 176.
Isopral, 761.
Itch ointment, 1227.
— — barber's, 1227.
Itrol, 758.
Ivory black, 266.
Ivy, American, 125.
— English, 178.
— ground, 173.
— poison, 213.
Izal, 761.

J

Jaborandi, 206, 871.
— fluidextract, 206, 700.
— folia, 206, 183, 871.
— elixir, 598.
— leaves, 206, 183, 871.
— liquid extract,
184, 701.
— tincture, 1062.
Jacandra, 184.
Jacinth perfume, 1305.
Jacob's oil, 1224.
Jalap, 184.
— comp. powder, 907.
— extract, 184, 657, 761.
— fluidextract, 184.
— resin, 184, 761, 917.
— tincture, 1062.
Jalapa, 184, 761.
Jalapæ resina, 761, 917.
Jalapic acid, 184.
Jalapin, 184, 761.
Jamaica dogwood, 207.
— — fluidextract, 207.
— ginger essence,
643, 1191, 1319.
— — extract, aro., 1192.

Jamaica sarsaparilla, 219.
— — fluidextract, 219.
Jambou, 184.
Jambul, 814.
— fluidextract, 184.
James' powder, 904.
Japan lacquer, 134.
— wax, 146.
Jasmine, triple ext., 1295.
— yeliow, 171.
Jatropha, 184.
— fluidextract, 184.
Jaundice laxative
bitters, 1160.
Java plum, 184.
— tree, 200.
— — leaves, fl.ext., 200.
Jeffersonia, 184.
Jelly arnica, 1289.
— glycerin, 1289.
Jellies, toilet, 1288.
Jequiritin, 116.
Jequiritol, 116.
— serum, 116.
Jequirity, 116.
— infusion, 116.
Jersey tea, 145.
Jicoma, 184.
Jockey club
extract, 1298.
— — perfume, 1305.
— — sachet, 1310.
Jonquil perfume, 1305.
Juglans, 184.
Juglandic acid, 185.
Juglandin, 185.
Juice of belladonna, 973.
— broom, 973.
— dandelion, 973.
— grape, unfermented,
1330.
— hemlock, 973.
— henbane, 973.
— lemon, 973.
— lime, 973.
— meat, 1319.
— taraxicum, 973.
Juices, 973.
— fruit, 973, 1330.
— inspissated, 648.
— unfermented
fruit, 1330,
Juniper, 185.
Juniper, 185.
— berries, 185.
— — elixir, 598.
— comp. spirit, 965.
— fluidextract, 185.
— oil, 185, 839.
— spirit, 965.
— tar, 839, 887.

Juniper tar ointment, 1110.
— wood, 185.
Juniperi lignum, 185.
Juniperus, 185.
— communis, 185.
— Virginiana, 185.

K

Kairine elixir, 598.
Kalium, 287, 891.
Kalkwasser, 444.
Kalmia, 185.
— fluidextract, 185.
Kamala, 185.
Kaolin, 421, 762.
— cataplasm, 492.
Kaolinum, 762.
Katharion hair tonic, 1287.
Katona catarrh cure, 1165.
Kava kava, 195.
— — fluidextract, 195.
Keratin, 762.
Kermes mineral, 253, 433.
Kidney and liver remedy, 1206.
— — remedies, 1204.
— and liverwort tea, 1207.
— pills, 1207.
Kino, 185, 762.
— Australian, 165.
— Bengal, 138.
— comp. powder, 907.
— tincture, 1062.
— — for wines, 1365.
Kiryat, 126.
Kissengen salts, effervescent, 1190.
— water, solution, 1346.
Kola, 186.
— and celery elixir, 599.
— coca syrup, 1341.
— — drinks, 1341.
— chewing gum, 1354.
— elixir, 599.
— fluidextract, 186.
— nuts, 186.
— tincture, 1063.
— wine, 1252.
Kolafra chewing gum, 1354.
— syrup, 1341.
Kosin, 158.
Koumiss, 763.
— coca, 764.
— euonymized, 764.
— malted, 764.
— peptonized, 764.

Kousso, 158.
Koussein, 158.
Krameria, 186.
— and cocaine lozenge, 1092.
— fluidextract, 697.
— extract, 657.
— infusion, 754.
— radix, 186.
— solution conc., 786.
— syrup, 994.
— tinctures, 1063, 1074.
— troches, 1091.
Krypton (element), 281.
Kümmel, 143, 1371.
— essence, 1371.
Kutnow's powder, 1235.

L

Labarraque's solution, 794.
Labdanum ointment, 1110.
Labrador tea, 188.
— — fluidextract, 188.
Lac dye, 187.
Lac—Milk, 113, 186, 763.
Lac sulphur, 314.
Lacca, 186.
— resina, 186.
Lactate iron syrup, 1013.
Lactated pepsin with phos. syrup, 1013.
— elixir, 599.
Lactates, 368, 765.
Lactic acid, 367, 765.
— — diluted, 368.
Lactin, 923.
Lactopeptine and bis-muth elixir, 600.
— — and strychnine elixir, 600.
— comp. syrup, 1013.
— elixir, 600.
— syrup, 1013.
Lactophenin, 765.
Lactophosphates combination syrup, 1014.
— comp. solution, 951.
Lactose, 923.
Lacto-somatose, 764.
Lactuca, 187.
— virosa, 187.
Lactucarium, 187, 766, 994.
— elixir, 600.
— tincture, 1064.
Lactucin, 187, 766.
Lactyl-phenetidine, 765.
Ladies' slipper, 158.
Ladies' slipper fluid-extract, 158, 691.
Lævo-glucose, 923.
Lævulose, 725, 923.
Lallemand's gout specific, 1232.
Lamellæ—Discs, 766.
Lamellæ atropinæ, 766.
— cocainæ, 766.
— homatropinæ, 766.
— physostigminæ, 766.
Lampblack, 265.
Lamps, cement for, 1374.
Lanalin, 393, 829.
— ointment, 1096.
Lanthanum, (element), 281.
— oxide, 281.
Lanthropine, 854.
Lapis, "crab's eye," 113.
Lapis infernalis, 453.
— lazuli, 248.
Lappa, 187.
— fluidextract, 697.
— major, 187.
— minor, 187.
— tomentosa, 187.
Larch bark, 187.
— — decoction, 187.
— — tincture, 187.
Lard, 119, 390.
— benzoated, 391, 1097.
— benzoinated, 391, 1097.
— oil, 391, 825.
— prepared, 391.
— washed, 391.
Laricis cortex, 187.
Larix Americana, 188.
Larkspur, 159.
— fluidextract, 159.
Latent heat, 80.
Laudanine, 854.
Laudanosine, 854.
Laudanum, 1068.
Laughing gas, 293.
Laundry indelible ink, 1391.
Laurel, 188.
— bay, 188.
— berries, 188.
— fluidextract, 188.
— oil, 188.
— expressed, 826.
Laurier-cerise conserve, 521.
Laurus nobilis, 188.
Laurocerasi folia, 188.
Lavender, 188.
— cologne, 1309.
— comp. tincture, 1065.
— essence, 1296.

- Lavender flowers, 188.
 — — oil, 839.
 — oil, 188.
 — spirit, 965.
 — — compound, 1065.
 — vinegar, 339.
 — water, 1309.
 Lavendula, 188.
 — vera, 188.
 Laville's gout mixture, 1217.
 Laxative bitters, 1160.
 — California fig, 1168.
 — child's, 1167.
 — comp. pills, 882.
 — cordial, 1166.
 — elixir, 600.
 — fig, 1168.
 — fruit lozenge, 1169.
 — tea, 957, 1170.
 Laxatives, 1166.
 Leaches, 179.
 Leaching, 98.
 Lead, 889.
 — (element), 281.
 — alloys, 281.
 — and opium pill, 884.
 — acetate, 889.
 — — ointment, 1106.
 — carbonate, 890.
 — — ointment, 1106.
 — iodide, 890.
 — — ointment, 1106.
 — — plaster, 633.
 — nitrate, 891.
 — ointment, 1106.
 — oxide, 891.
 — plaster, 632.
 — red, 282.
 — salts of, general, 281.
 — subacetate cerate, 495.
 — — glycerin, 731.
 — — liniment, 769.
 — — ointment, 1100.
 — — solution, 789.
 — — — diluted, 790.
 — sugar of, 281, 889.
 — suppositories compound, 982.
 — white, 281.
 Leatherwood, 160.
 — fluidextract, 160.
 Leaves, 111.
 Ledum, 188.
 — palustra, 188.
 — latifolium, 188.
 Lemon, 189.
 — essence, 1296, 1317.
 — extract, soluble, 1326.
 — -grass essence, 1296.
 Lemon ice, 1348.
 — juice, 189, 973.
 — oil, 839.
 — peel, 189.
 — — crystallized, 189.
 — phosphate syrup, 1336.
 — syrup, 995, 1336.
 — yellow, 519.
 Leonurus, 188.
 Leptandra, 189.
 — extract, 189, 658.
 — fluidextract, 189, 698.
 Leptandrin, 189.
 Lethon, 396.
 Lettuce, 187.
 — opium, 187.
 — wild, 187.
 — — fluidextract, 187.
 Leucoline, 498.
 Levant wormwood, 218.
 Levisticum, 189.
 Liatrin, 189.
 Liatris, 189.
 — fluidextract, 189.
 Licorice compound syrup, 1021.
 — comp. elixir, 601.
 — elixir, 601.
 Liebig's corn colodion, 516.
 Life drops, Hunn's, 1209.
 — everlasting, 174.
 — — fluidextract, 174.
 — root, 222.
 — — fluidextract, 222.
 Light calcined magnesia, 802.
 — magnesia, 802.
 — magnesium carbonate, 803.
 — — oxide, 802.
 Lightning, fluid, 1212.
 — hair dye, 1278.
 — inhalant, 1202.
 — tooth ache remedy, 1248.
 Lignite, 266.
 Lilies, cream of, 1266.
 Lily of the valley, 154.
 — — fluidextract, 691.
 — — perfume, 1298.
 — — tincture, 1052.
 Limatura martis præparata, 667.
 Lime, 487.
 — chloride of, 487.
 — chlorinated, 487.
 — essence, 1317.
 — fruit syrup, 1336.
 — — phosphate, 1336.
 Lime hydrate, 485.
 — hypophosphites syrup, 1008.
 — iodide syrup, 1011.
 — liniment, 767.
 — phosphate syrup, 1015.
 — slaked, 485.
 — solution, 444, 775.
 — — chlorinated, 776.
 — sulphurated, 488.
 — syrup, 987.
 — water, 444, 775.
 — — stronger, 636.
 Limette oil, 840.
 Limones, 189.
 Limonis cortex, 189.
 — succus, 189.
 Linaloa oil, 840.
 — essence, 1296.
 Linden, American, 229.
 — flowers, 229.
 Lindera, 189.
 Linear, surface and cubic measure, 60.
 Liniment, ammonium iodide, 1212.
 — aconite, 766.
 — ammonia, 767.
 — arnica, 1208.
 — belladonna, 767.
 — camphor, 768.
 — — ammoniated, 768.
 — camphor comp., 786.
 — cantharides, 768.
 — chloroform, 768.
 — cocaine, 1208.
 — croton oil, 769.
 — eclectic, 1209.
 — gargling oil, 1212.
 — Indian, 1209.
 — lime, 767.
 — menthol, 1210.
 — mercury, 769.
 — Mexican, 1212.
 — mustard, 771.
 — — compound, 771.
 — nerve and bone, 1213.
 — neuralgia, 1213.
 — ready oil, 1213.
 — rheumatic, 1213.
 — rosemary comp., 1107.
 — soap, 770.
 — soft soap, 770.
 — Stoke's, 1214.
 — thymol-chloral, 1211.
 — turpentine, 771.
 — — and acetic acid, 771.
 — veterinary, 1214.
 — volatile, 767.

- Liniment, wizard, 1211.
 — wonder, 1214.
 Linimenta—
 Liniments, 766.
 Liniments, pro-
 prietary, 1208.
 Linimentum
 aconiti, 706.
 — ammoniæ, 767.
 — belladonnæ, 767.
 — calcis, 767.
 — camphoræ, 768.
 — — ammoniatum, 768.
 — cantharidis, 768.
 — crotonis, 769.
 — hydrargyri, 769.
 — opii, 769.
 — — ammoniatum, 769.
 — plumbi sub-
 acetatis, 769.
 — potassii iodidi
 cum sapone, 769.
 — saponis, 770.
 — — mollis, 770.
 — sinapis comp., 771.
 — terebinthinæ, 771.
 — — aceticum, 771.
 Linotype-metal, 253.
 Linseed, 190.
 — crushed, 190.
 — meal, 190.
 — oil, 826.
 Linum, 190.
 — contusum, 190.
 Lip salves and
 cosmetics, 1290.
 Lippia Mexicana, 190.
 — — tincture, 190.
 Liquefied carbolic
 acid, 352, 865.
 — phenol, 352, 865.
 Liquidambar, 134, 190.
 — orientalis, 134.
 — styraciflua, 134.
 Liquid aloes, 416.
 — blistering, 778.
 — carbonic acid, 353.
 — cement, 1375.
 — cosmetics, 1266.
 — depilatory, 1277.
 — extract cascara
 sagrada, 702.
 — — cinchona, 690.
 — — cimicifuga, 689.
 — — coca, 690.
 — — ergot, 692.
 — — hamamelis, 696.
 — — hydrastis, 696.
 — — ipecacuanha, 697.
 — — jaborandi, 701.
 — — liquorice, 694.
 Liquid extract
 male fern, 693.
 — — nux vomica, 699.
 — — opium, 699.
 — — pareira, 700.
 — — sarsaparilla, 705.
 — — taraxacum, 708.
 — glue, 1375.
 — — French, 1376.
 — India ink, 1388.
 — opodeldoc, 770.
 — padding glue, 1377.
 — paraffin, 858, 862.
 — pearl enamel, 1267.
 — petrolatum, 862.
 — rennet, 1257.
 — rouge, 518, 1267.
 — slating for
 blackboards, 1392.
 — soap, acme, 1313.
 — — peerless, 1313.
 — soaps, 1313.
 Liquids, nebulizing, 1217.
 — shampoo, 1286.
 Liquor acidi
 phosphorici, 1138.
 — — — comp., 1138.
 — acidi arsenosi, 772.
 — and Habit
 Cures, 1214.
 — ammonii anisatus, 960.
 — arsenici hydro-
 chloricus, 772.
 — ammoniæ, 772.
 — — fortis, 773.
 — ammonii acetatis, 773.
 — — citratis, 773.
 — antisepticus, 773.
 — arsenicalis, 774.
 — arseni et hydrargyri
 iodidi, 774.
 — atropinæ
 sulphatis, 775.
 — bismuthi, 775.
 — brom-chloral
 comp., 1221.
 — calcis chlorinatæ, 776.
 — — saccharatus, 776.
 — calumbæ conc., 777.
 — caoutchouc, 777.
 — chiritæ conc., 777.
 — chlori comp., 777.
 — chromici, 772.
 — cresoli comp., 778.
 — caesoli saponis, 526.
 — cuspariæ conc., 778.
 — epispasticus, 778.
 — ethyl nitratis, 779.
 — ferri acetatis, 779.
 — — chloridi, 779.
 — — citratis, 780.
 Liquor ferri et am-
 monii acetatis, 781.
 — — et quininæ
 citratis, 781.
 — — nitratis, 782.
 — — perchloridi, 781.
 — — — fortis, 782.
 — — pernitratæ, 782.
 — — persulphatis, 782.
 — — subsulphatis, 783.
 — — tersulphatis, 783.
 — ferratini, 679.
 — formaldehydi,
 720, 784.
 — gutta percha, 784.
 — hamamelidis, 785.
 — hydrargyri
 nitratis, 785.
 — — — acidus, 785.
 — — perchloridi, 785.
 — hydrogenii per-
 oxidi, 447, 785.
 — hypophosphitum com-
 positum, 786, 949.
 — iodi comp., 786.
 — — fortis, 786.
 — krameriæ conc., 786.
 — magnesiæ carb., 787.
 — — citratis, 787.
 — morphinæ
 acetatis, 788.
 — — hydrochloridi, 788.
 — — tartratis, 788.
 — pancreatis, 789.
 — picis carbonis, 789.
 — plumbi sub-
 acetatis, 789.
 — — — dilutus, 790.
 — — — fortior, 790.
 — potassæ, 791, 792.
 — potassii arsenitis, 791.
 — — hydroxidi, 792.
 — permangan-
 atis, 792.
 — quassiæ conc., 792.
 — rhei conc., 792.
 — sarsæ compositus
 concentratus, 793.
 — senegæ conc., 793.
 — sennæ conc., 793.
 — serpentariæ conc., 794.
 — sodæ chlorinatæ, 794.
 — — chloratæ, 794.
 — sodii arsenitis, 795.
 — — ethylatis, 795.
 — — hydroxidi, 795.
 — — phosphatis
 compositus, 796.
 — — silicatis, 796.
 — strychninæ hydro-
 chloridi, 796.

- Liquor thyroidei, 796.
 — trinitrini, 797.
 — sedativus, 340.
 — zinci chloridi, 797.
 Liquorice root, 173
 — extract, 656.
 — fluidextract, 173.
 — liquid extract, 173, 694.
 — powder comp., 906.
 Liqueores, 946.
 Liqueores—Solutions, 772.
 Liqueurs,—Spiritous,
 1355.
 Liriodendrin, 190.
 Liriodendron, 190.
 Lisol, 801.
 Listerine, 773, 1146.
 Litharge, 282, 890.
 Lithia water, 1345.
 Lithiated
 hydrangea, 1232.
 — strontium com-
 pound elixir, 602.
 Lithic acid, 1111.
 Lithii benzoas, 798.
 — bromidum, 798.
 — carbonas, 799.
 — citras, 799.
 — — effervescens, 800.
 — salicylas, 800.
 Lithium, 798.
 — (element), 282.
 — combinations, 283.
 — benzoate, 798.
 — bromide, 798.
 — carbonate, 799.
 — citrate, 799.
 — — effervescent, 800.
 — citrate elixir, 601.
 — diuretic, 1111.
 — salicylate, 800.
 — salts, elixirs, 602.
 — salts of, general, 283.
 — salts, other, 801.
 Litmus blue, 519.
 Liver and Kidney
 Remedies, 1204.
 Liver bitters,
 German, 1150.
 — of antimony, 254.
 — of sulphur, 893.
 — pills, cathartic, 1169.
 — — little giant, 1169.
 Liverwort, 179.
 — fluidextract, 179.
 Lixiviation, 98.
 Lobelia, 190.
 — etherial tinct., 1066.
 — fluidextract, 190, 698.
 — tincture, 1066.
 — vinegar, 339.
 Lobelin, 190.
 Lobeline, 190.
 Local anæsthetic,
 tooth-ache, 1248.
 Locatelle's balsam, 1153.
 Logwood, 177.
 — decoction, 533.
 — extract, 177, 656.
 — fluidextract, 177.
 London cordial
 gin, 1357.
 Losophan, 529.
 Lotio hydrargyri
 flava, 801.
 Lotio nigra, 801.
 — hydrargyri nigra, 801.
 Lotion acne, 1290.
 — almond hair, 1280.
 — anti-freckle, 1290.
 — bay hair, 1281.
 — black heads, 1291.
 — chilblain, 1174.
 — comedones, 1291.
 — eczema, peer-
 less, 1292.
 — face, 1291.
 — freckle, 1291.
 — glycerin, 1291.
 — hair, 1287.
 — moth, 1291.
 — pimple, 1292.
 — rose hair, 1281.
 — stimulating hair, 1281.
 — wrinkle, 1292.
 Lotiones—Lotions, 801.
 Lotions for the
 toilet, 1290.
 — hair, 1280.
 Lovage, 189.
 — root, 189.
 — seed, 189.
 Low's magnetic
 liniment, 1212.
 Low wines, 403.
 Lozenges, 1025, 1353.
 — cough, 1183.
 — other, 1353.
 — peppermint, 1353.
 Lugol's solution, 786.
 Luminous paste for
 rats etc., 1386.
 Lunar caustic, 307, 453.
 Lung balsam, 1108.
 — moss, 225.
 Lungwort, 209.
 — fluidextract, 209.
 Lupulin, 180, 191.
 — fluidextract, 191, 698.
 — oleoresin, 191.
 Lupulinum, 191.
 Lupulus, 179.
 Lupus metallorum, 431.
 Lutecium (element), 284.
 Lycopin, 191.
 Lycopodium, 191.
 — powder, 191.
 Lycopus, 191.
 — fluidextract, 191.
 — Europæus, 191.
 — — fluidextract, 191.
 Lymph, 113.
 Lysol, 529, 801.

M

- Mace, 191.
 — essence, 1317.
 — oil, 191.
 Macerated oils, 846.
 Maceration, 98.
 Machine suppos-
 itories, 979.
 Macis, 191.
 Macrocin, 149.
 Maddar, 214.
 Magic balm, 1151.
 — corn salve, 1173.
 Magnesia, 804.
 — and asafetida
 mixture, 815.
 — calcined, 804.
 — fluid, 787.
 — heavy, 803.
 — — calcined, 803.
 — Henry's, 803.
 — Husband's, 803.
 — levis, 802.
 — light, 802.
 — — calcined, 802.
 — milk of, 804.
 — ponderosa, 803.
 Magnesian
 aperient, 1346.
 Magnesii carbonas, 803.
 — oxidum, 804.
 — — ponderosum, 804.
 — sulphas, 805.
 — — effervescens, 805.
 Magnesium, 284, 802.
 — (element), 284.
 — aperient, 1147.
 — carbonate, 803.
 — — solution, 787.
 — — heavy, 803.
 — — light, 803.
 — citrate solution, 787.
 — combinations, 284.
 — flash light, 284.
 — oxide, 804.
 — — heavy, 803, 804.
 — — light, 802.
 — salts of, 285.
 — salts, other, 806.

- Magnesium sulphate, 805.
 — — effervescent, 805.
 Magnetic balm, 1151.
 — — uniment, Low's, 1212.
 — — ointment, 1227.
 Magnolia, 191.
 — — fluidextract, 192.
 Magnolin, 192.
 Manogany, African, 227.
 Maiden hair, 119.
 — — fern syrup, 1019.
 — — fluidextract, 119.
 — — syrup, 119.
 Madis stigmata, 192.
 Maizenic acid, 235.
 Majorana, 192.
 Malarin, 331.
 Male fern, 132.
 — — extract, 849.
 — — fluidextract, 132, 393.
 — — liquid extract, 850.
 — — oleoresin, 132.
 Malic acid, 380.
 Mallotus philippinensis, 185.
 Mallow, 193.
 Malt, 192.
 — — extract, 658.
 — — and compound elixirs, 602.
 — — soothing syrup, 1238.
 — — tonic syrup, 1337.
 — — vinegar, 334.
 Malto, 1343.
 Maltose, 725, 923.
 Maltum, 192.
 Malva, 193.
 — — flowers, black, 193.
 — — blue, 193.
 Malvina cream, 1269.
 Manaca, 192.
 — — and salicylates elixir, 602.
 — — fluidextract, 192.
 Manacine, 192.
 Mancona bark, 165.
 — — fluidextract, 165.
 Mandelate, 866.
 Mandrake bitters, 1160.
 — — comp. elixir, 602.
 — — fluidextract, 207.
 — — root, 207.
 Manganese, 286, 806.
 — — (element), 286.
 — — combinations, 286.
 — — dioxide precip., 807.
 — — hypophosphite syrup, 1010.
 — — solution, 951.
 — — iodide syrup, 1012.
 Manganese lactophosphate solution, 951.
 — — oxides, 287, 288.
 — — phosphate solu., 951.
 — — salts of, general, 287.
 — — salts, other, 808.
 — — sulphate, 808.
 Mangani dioxidum præcipitatum, 807.
 — — hypophosphis, 807.
 — — sulphas, 808.
 Manganic acid, 288.
 Manganous hypophosphite, 807.
 Mangostana, 193.
 mangosteen, 193.
 — — fluidextract, 193.
 Manicure powder, 1294.
 — — salve, 1294.
 Manna, 193.
 Mannheim gold, 271.
 Mannit, 925.
 Mannite (mannitol), 193.
 Mannitose, 923.
 Manometer, 246.
 Manzanita, 193.
 — — fluidextract, 193.
 Maple cream
 candy, 1351.
 syrup, 1337.
 Maranta, 126.
 Marashino, 1372.
 Margose bark, 133.
 Margosine, 133.
 Marine glue, 1376.
 Maritina cocktail, 1368.
 Marjoram, wild, 200.
 Marigold tincture, 1041.
 Marking inks, 1392.
 Marrubium, 193.
 — — comp syrup, 1022.
 Marseilles vinegar, 336.
 Marsh gas, 267.
 Marshmallow, 124.
 — cream, 1269.
 Marshmallows, 1352.
 Marsh rosemary, 225.
 — — fluidextract, 225.
 — — tea, 188.
 Mary Stewart perfume, 1298.
 Mass, blue, 809.
 — — of ferrous carbonate, 808.
 — — of mercury, 809.
 — — Vallet's, 808.
 Massa ferri carbonatis, 808.
 — — hydrargyri, 809, 882.
 Massæ—Masses, 808.
 Massage cream, 1293.
 Massage cream,
 greaseless, 1293.
 — — ointment, 1293.
 — — pastes, 1293.
 — — pomade, 1293.
 — — preparations, 1293.
 Masses, veterinary, 1260.
 Masterwort root, 182.
 Mastic, 919.
 — — gum, 193.
 — — spirit comp., 968.
 Mastiche, 193, 919.
 Maté, 182.
 Matico, 194.
 — — comp. elixir, 603.
 — — fluidextract, 194, 698.
 — — oil, 194.
 Matricaria, 194.
 Mattenheimer's disinfecting solution, 1384.
 Mauvine, 430.
 Maw seed, 202.
 May apple, 207.
 — — weed, 128.
 Mayer's ointment, 1110.
 McLean's strengthening cordial, 1245.
 Mead extract
 excelsior, 1327.
 — — extract, soluble, 1327.
 Meal, almond, 1311.
 Measures and weights, 57.
 — — early history, 57.
 Measures of length, 67.
 — — surface, 68.
 — — cubic, 68.
 — — heat, 77.
 Meat extract, 1319.
 — — juice or essence, 1319.
 Meconates, 368.
 Meconic acid, 368, 854.
 Meconidina, 854.
 Meconidine, 854.
 Meconine, 854.
 Meconisin, 854.
 Medical prefixes, 23.
 — — suffixes and terminations, 29.
 — — terms and definitions, 31.
 — — discovery, 1237.
 Medicated cottons, 734.
 — — globules, 1136.
 — — oils, 1223.
 — — pellets or discs, 1136.
 — — vinegars, 335.
 — — general formula, 336.
 — — waters, 438, 440.

- Medicinal wines, 1251.
 — — other, 1120.
 Medicines
 Proprietary, 1137.
 — Homœopathic, 1133.
 Medleys, 432.
 Mel, 194, 809.
 — boracic, 810.
 — depuratum, 810.
 — despumatum, 810.
 — rosæ, 810.
 Melezitose, 923.
 Melilot, 194.
 Melilotus, 194.
 Melissa, 194.
 — fluidextract, 194.
 Melitose, 923.
 Melting point of
 elements, 245.
 Mendeljeff's periodic
 table, 240.
 Menispermum, 194.
 Menispermum, 194.
 Mentha piperita, 194.
 — arvensis, 195.
 — viridis, 195.
 Menthol, 195, 810, 840.
 — cones, 811.
 — Japanese, 195.
 — inhalers, 1202.
 — liniment, 1210.
 — plaster, 631.
 — tooth-ache
 remedy, 1248.
 — valerate, 1112.
 — valerianate, 232.
 Menyanthes, 195.
 Menzies' spruce, 115.
 Mercurial lotion,
 black, 801.
 — ointment, 1101.
 — plaster, 630.
 Mercurialis annua, 195.
 Mercuric ammonium
 chloride, 739.
 — chloride, 740.
 — — solution, 785.
 — compound, 288.
 — iodide, 743.
 — — ointment, 1102.
 — nitrate
 ointment, 1002.
 — — diluted, 1103.
 — nitrate solution, 785.
 — — acid, 785.
 — oleate, 743.
 — — ointment, 1003.
 — oxides oint-
 ment, 1103.
 — oxide red, 744.
 — oxide yellow, 744.
 Mercurio-vegetal, 192.
 Mercurous chloride, 741.
 — — ointment, 1104.
 — — comp. pill, 882.
 — compounds, 288.
 — iodide yellow, 742.
 Mercury, 738.
 — (element) 288.
 — amalgams, 288.
 — ammoniated, 739.
 — — ointment, 1101.
 — bichloride, 740.
 — — elixir, 577.
 — biniodide, 743.
 — chlorides, 741, 742.
 — compounds, 288.
 — comp. ointment, 1102.
 — cyanide, 741.
 — etherate, 398.
 — green iodide, 742.
 — ointment, 1101.
 — oleate, 848.
 — pill, 882.
 — protiodide, 742.
 — red iodide, 743.
 — — oxide, 744.
 — salts of, general, 288.
 — subchloride, 741.
 — weed, 195.
 — — fluidextract, 195.
 — with chalk, 739.
 — yellow iodide, 742.
 — — oxide, 744.
 Metaboric acid, 475.
 Metacresol, 528.
 Metal, fusible, 257.
 — — Darcet's, 258.
 — — Newton's, 258.
 — — Wood's, 258.
 — cement, 1374.
 Metaldehyde, 859.
 Metaloids, 243.
 Metals, 243.
 Metals, densities of, 244.
 — oleates, 849.
 Metaphosphoric
 acid, 868.
 Methane, 267.
 Methyl, 811.
 Methyl salicylate,
 811, 1303.
 Methylacetanilid, 647.
 Methylacetone, 331.
 Methylated spirit, 401.
 Methylene blue,
 430, 812.
 Methylic acid, 356.
 — alcohol, 410.
 Methyl-iso amyl-
 benzene, 464.
 Methylis salicylas, 811.
 Methylproto catechuic
 aldehyde, 1112.
 Methyl-pyro-
 catechin, 734.
 Methylthionine hydro-
 chloridum, 812.
 Methylthyonine hydro-
 chloride, 812.
 Methysticum, 195.
 Metol, 888.
 Metric Fluid
 Measures, 66.
 — — — equivalents, 67.
 — weight and
 measure, 59.
 — weights, 63.
 — — equivalents, 63.
 Metrology, 57.
 Mexican liniment, 1212.
 — wormwood, 130.
 Mezerei cortex, 195.
 Mezerein, 195.
 Mezereon bark, 195.
 Mezereum, 195.
 — fluidextract, 699.
 Microcin, 310.
 Micromeria, 196.
 Migraine elixir, 627.
 Mikania, 196.
 Mild mercurous
 chloride, 741.
 Milfoil, 118.
 Milk, 186, 766.
 — condensed, 764.
 — malted, 764.
 — of almonds, 1292.
 — of magnesia, 804.
 — of roses, 1292.
 — of sulphur, 976.
 — powdered, 764.
 — punch syrup, 1335.
 — sugar, 765, 923.
 — shake punch, 1342.
 Mineral alkali, 412.
 — glycerin, 726.
 — oils, 845.
 Mineral Waters, 1345.
 Minerals, 243.
 Minium, 282.
 Mint, soda, 1259.
 Mirbane, oil of, 464.
 Mishmi teeta, 154.
 Mistletoe,
 American, 205.
 — — fluidextract, 205.
 Mistura ammoniaci, 812.
 — amygdalæ, 637, 812.
 — asafoetidæ, 637.
 — bismuthi comp., 813.
 — chloroformi, 637.
 — creosoti, 813.

- Mistura cretæ, 813.
 — ferri comp., 814.
 — — et ammonii acetatis, 814.
 — glycyrrhizæ composita, 814.
 — guaiaci, 815.
 — magnesii et asafœtidæ, 815.
 — oleo-balsamica, 1217.
 — olei ricini, 815.
 — potassii citratis, 791.
 — rhei et sodæ, 815.
 — sennæ comp., 816.
 — spiritus vini Gallici, 816.
 Misturæ—Mixtures, 812.
 Mitchella, 196.
 — comp. syrup, 1022.
 Mithridate, 1030.
 Mitigated caustic, 453.
 — silver nitrate, 453.
 Mixing, 82.
 Mixture, ague, 1139.
 — alkaline
 copaiba, 1216.
 — almond, 812.
 — ammoniacum, 812.
 — anti-epileptic, 1216.
 — asafetida, 637.
 — Bert's antineuralgic, 1215.
 — bismuth comp., 813.
 — brandy, 816.
 — brown, 814.
 — castor oil, 815.
 — chalk, 813.
 — Chapman's
 copaiba, 1216.
 — copaiba, santal and cubeb, 1216.
 — creosote, 813.
 — diarrhœa, Gould's, 1217.
 — — Squibb's, 1217.
 — — Velpeau's, 1217.
 — Fothergill's asthma, 1216.
 — Gadbury's spleen, 1217.
 — glycyrrhiza compound, 814.
 — gout, Laville's, 1217.
 — Griffith's, 814.
 — guaiacum, 815.
 — Hope's camphor, 1216.
 — hydrate, 410.
 — iron and conium, 1217.
 — — compound, 814.
 Mixture, Jackson's
 cholera, 1216.
 — — cough, 1216.
 — — magnesia and asafetida, 815.
 — Paris' carminative, 1216.
 — Pancoast's cough, 1216.
 — rhubarb and soda, 815.
 — senna comp., 816.
 — theobromine, 431.
 — Townsend's, 1217.
 Mixtures, cholera, 1172.
 — cough, 1177.
 — proprietary, 1215.
 Molasses candy, 1352.
 Molecular weight, 238.
 Molecules
 (chemical), 238.
 Molybdenum
 (element), 290.
 — alloys, 290.
 — compounds, 290.
 Molybdic acid, 290.
 Monamines, 250.
 Monarda, 196.
 Monazotic sand, 267.
 Monesia, 196.
 — extract, 196.
 Monkey bread, 119.
 Mono-bromated camphor comp.
 elixir, 603.
 Monol, 264.
 Monomethylcatechin, 734.
 Mononitrocellulin, 912.
 Monsell's disinfecting solution, 1384.
 — salt, 280.
 Moonseed,
 Canadian, 194.
 Moosewood, 160.
 — fluidextract, 161.
 Morrhuc acid, 827.
 Morrhucine, 827.
 Morrhucol, 820.
 Morrhucolines, 826.
 Morrhucolum, 820.
 Morphina, 816.
 Morphine, 816, 854.
 — acetate, 817.
 — — solution, 788.
 — and ipecac lozenge, 1092.
 — antidote, 819.
 — borate, 819.
 — bromide elixir, 603.
 Morphine bromide
 syrup, 1005.
 — bromides comp.
 syrup, 1005.
 — comp. powder, 908.
 — diacetal, 737, 819.
 — elixir, 603.
 — hydrochloride, 818.
 — — solution, 788.
 — hypodermic injection, 751.
 — lozenge, 1092.
 — oleate, 849.
 — phthalate, 819.
 — Pure Food and Drugs Law, 817.
 — sulphate, 818.
 — suppositories, 982.
 — syrup, 1014.
 — tartrate, 819.
 — — solution, 788.
 — valerate elixir, 603.
 Morphine acetate, 817.
 — hydrochloridum, 818.
 — sulphas, 818.
 — tartras, 819.
 Morus, 196.
 Moschus, 196.
 Mosquito and black fly preventive, 1386.
 Moss, hair-cap, 208.
 — Iceland, 147.
 — Irish, 148.
 — lung, 225.
 Moth, camphor, 822.
 Mother of vinegar, 335.
 — Siegle's curative syrup, 1193.
 Motherwort, 188.
 — fluidextract, 188.
 Moulded silver nitrate, 453.
 Moustache wax, 1283.
 Mouth waters, 1276.
 — glue, 1376.
 Moxie nerve food, 1343.
 Mountain sage, 130.
 Moyrapuama, 118.
 Mrs. Allen's hair restorer, 1286.
 Mucilage, acacia, 820.
 — casein, 1377.
 — dextrin, 534, 1377.
 — for tin or metal, 1377.
 — gum arabic, 820.
 — label, 1377.
 — of elm, 821.
 — sassafras pith, 821.
 — stamp, 1377.
 — syrup acacia, 631.
 Mucilages, 1377.

Myricia, 197.
— oil, 197.
Myricin, 146, 197.
Myristica, 198.
Myristicæ adeps, 827.
Myrrh, 197, 821.
— Indian, 135.
— tincture, 1067.
Myrrha, 197, 821.
Myrrhic acid, 197.
Myrrhol, 197.
Myrtle -wax, 197.
— Dutch, 197.
— — fluidextract, 198.
— oil, 198.
Myrtol, 197.

N

Nail cosmetics, 1294.
— powder, 1294.
— salve, 1294.
Naphthalin, 510.
Naphtha, 463, 863.
— petroleum, 464.
— wood, 968.
Naphthalene, 822.
Naphthalenum, 822.
Naphthalol, 468, 469.
Naphthol, 822.
— alpha, 468.
— aristol, 468.
— beta, 468.
Naphtho-salol, 468, 469.
Naphthol, 468.
Narceine, 854.
Narcotine, 854.
Nargol, 455.
Nascent phenic acid
syrup, 1015.
Natrium, 307, 932.
— aceticum, 933.
— benzoicum, 934.
— bicarbonicum, 935.
— causticum, 851.
Natural oleo-
resins, 851.
Neapolitan nougat, 1352.
Neatsfoot oil, 829.
Nebulizing liquids, 1217.
Nectandra bark, 135.
Nectar syrup, 1337.
Nectarine syrup, 1337.
Neem bark, 133.
Negrosine, 429.
Neodymium
— (element), 291.
Neotterbium, 323.
Nephritic comp., 1207.
Neroli essence, 1296.
— oil, 835.
Nerolin, 1302.

Nerve and bone
liniment, 1213.
— food, Moxie, 1343.
— soda tonic, 1343.
Nervine balsam, 1111.
— elixir, 1219.
— ointment, 1111.
— sedative elixir, 1220.
— tonic, 1219.
Nerves, Hypnotics
and Sedatives, 1219.
Nervurina, 1220.
Nesbit's specific, 1216.
Nettle, 231.
— fluidextract, 231.
Nettle-leaved
verbena, 233.
Neuralgia remedy, 1213.
Neurodin, 342.
Neurosin, 263.
Neutralizing powder
for wine, 1364.
— syrup, 1022.
New skin, 517.
New York "Sun"
cholera mixture,
1171.
Nickel (element), 291.
— alloys, 291.
— compound, 291.
— plating, 291.
— salts of, 291.
Nicotina, 198.
Nicotine, 198.
Niccolum—Nickel, 823.
Nicomorrhaine, 827.
Night blooming
cereus, 138, 1299.
— — — fluidext., 138.
— — — tincture, 138.
Night corn
remover, 1174.
Nitrates, 369.
Nitre, 901.
Nitric acid, 368.
— — diluted, 370.
Nitrification, 293.
Nitrites, 293.
Nitrogen (element), 292.
— acids of, 293.
— compounds, 293.
Nitrogenium—
Nitrogen, 823.
Nitrogenized oils, 831.
— iron syrup, 1012.
Nitroglycerin, 292, 726.
— comp. elixir, 603.
— solution, 797.
— spirit, 964.
— tablets, 1025.
Nitrobenzol, 464.

- Nitrohydrochloric acid, 370, 371.
 Nitromuriatic acid, 370.
 Nitroso-nitric acid, 294.
 Nitrous acid, 371.
 — ether, 398.
 — — conc., 398, 959.
 — — spirit, 958.
 Nomenclature, chemical, 238.
 Nordhausen sulphuric acid, 381.
 Non-metals, 243, 244.
 Normal tartrates, 387.
 Norway spruce, 115.
 Norwood's tincture veratrum, 1084.
 Nosophen, 1029.
 — -bismuth, 1029.
 — -mercury, 1029.
 — -sodium, 1029.
 Not-metals, densities of, 244.
 Noyau syrup, 1337.
 Noyeau, 1372.
 Nuclein, 824.
 Nuphar advena, 198.
 Nut caramels, 1349.
 — oils, 830.
 Nutgall, 171.
 — fluidextract, 171.
 — ointment, 1100.
 — tincture, 1055.
 Nutmeg, 198.
 — butter, 827.
 — essence, 1317.
 — oil, 198, 841.
 — — expressed, 827.
 — spirit, 966.
 Nutritive soothing syrup, 1239.
 Nuts, 111.
 Nux—Nuts, 198.
 Nux vomica, 198.
 — — elixir, 604.
 — — extract, 198, 659, 824.
 — — fluidext., 198, 699.
 — — liquid ext., 198, 699.
 — — tincture, 1067, 1080.
 Nymphæa, 199.
- O
- Oak, poison, 213.
 — white, 211.
 — — fluidextract, 211.
 Oat meal, 133.
 Oats, concentrated tincture, 1258.
 — rolled, 133.
 Oats, decorticated, 133.
 Obesity remedies, 1223.
 Obstetrical ointment, 1111.
 Ocean spray, perfume, 1299.
 Odontine tooth-paste, 1274.
 Odontunder, 1248.
 Odors of flowers, 1297.
 — synthetic, 1304.
 Odorous substances, extracts for perfumes, 1296.
 Œnothera biennis, 199.
 Œnanthe phellandrium, 199.
 Oh-ren, 154.
 Oil, almond, expressed, 825.
 — amber, 843.
 — ambergris, 846.
 — angleworm, 829.
 — aniline, 429.
 — anise, 835.
 — arnicated, 1223.
 — bay, 841.
 — bayberry, 830.
 — bear's, 829.
 — beech nut, 830.
 — benné, 828.
 — benzoin, 846.
 — bergamot, 834.
 — betula, 836.
 — birch, empyreumatic, 842.
 — bitter almond, 834.
 — — — artificial, 462.
 — bone, 491.
 — brazil nut, 830.
 — burdock, 830.
 — cable, 841.
 — cade, 836, 839.
 — cajuput, 836.
 — camphorated, 768.
 — candle nut, 830.
 — caraway, 836.
 — — chaff, 836.
 — carbon, 863.
 — — flashing point, 863.
 — — test, 863.
 — cardamom, 830.
 — carron, 767.
 — castor, 828.
 — catarrh, 1164.
 — chamomile, 835.
 — chaulmoogra, 830.
 — chenopodium, 837.
 — cinnamon, 837.
 — cloves, 836.
 Oil, coconut, 826, 830.
 — copaiba, 837.
 — coriander, 837.
 — cotton seed, 174, 826.
 — croton, 829.
 — cubeb, 837.
 — cucumber, 830.
 — dill, 835.
 — dugong, 830.
 — earache, 1187.
 — eclectic, 1209.
 — ergot, 830.
 — erigeron, 838.
 — etherial, 833.
 — eucalyptus, 838.
 — eulachon, 830.
 — fennel, 838.
 — fir, 115.
 — flaxseed, 826.
 — fousel or fusel, 409, 426.
 — garlic, artificial, 415.
 — golden, 1211.
 — goose, 829.
 — hair base, 1281.
 — — coloring, 1281.
 — Harlem, 846.
 — hemlock, 115.
 — hempseed, 830.
 — hen's, 829.
 — hyoscyamus seed, 830.
 — juniper, 839.
 — — empyreumatic, 839.
 — — tar, 836.
 — lard, 391, 825.
 — larkspur seed, 830.
 — laurel expressed, 826.
 — lavender flowers, 839.
 — lemon, 839.
 — limes, 840.
 — linaloa, 840.
 — mace, 840.
 — mangosteen, 831.
 — menhaden, 830.
 — mineral, 845.
 — musk, 846.
 — mustard, artificial, 415.
 — — expressed, 828.
 — volatile, 843.
 — myrbane, 464.
 — neatsfoot, 829.
 — neroli, 835.
 — — bigarde, 835.
 — — petale, 835.
 — — petit grain, 836.
 — nicker seed, 830.
 — nutmeg, 841.
 — — expressed, 827.
 — oilve, 827.

- Oil, omega, 1224.
 — orange flowers, 835.
 — — peel, 835.
 — origanum, 844.
 — palm, 828.
 — paraffin, 845.
 — peach pit or persico, 830.
 — pennyroyal, 838.
 — peppermint, 840.
 — pimento, 841.
 — pine, 841.
 — — needles, 841.
 — pineapple, 479.
 — pinus pumilio, 841.
 — porpoise, 830.
 — pumpkin seed, 830.
 — rape seeds, 828.
 — rattlesnake, 829.
 — red, 847.
 — rhodium, 846.
 — rock, 846.
 — rose, 842.
 — rosemary, 842.
 — rue, 842.
 — sandal wood, 843.
 — santal, 843.
 — savin, 842.
 — seal, 830.
 — Seneka, 845.
 — sesamum, 828.
 — shark, 830.
 — signal, 863.
 — skunk's, 829.
 — soot, 727.
 — spearmint, 840.
 — sperm, 829.
 — spike, 846.
 — spruce, 115.
 — St. Jacob's, 1224.
 — styrax, 846.
 — sweet birch, 836.
 — sunflower seed, 830.
 — tanner's, 830.
 — tar, 841.
 — theobroma, 505, 828.
 — thyme, 844.
 — tonka bean, 830.
 — train oil, 830.
 — tucum, 831.
 — turpentine, 844.
 — — emulsion, 639.
 — — rectified, 844.
 — valerian, 845.
 — vitalized, 1225.
 — walrus, 830.
 — whale, 830.
 — wine, heavy, 834.
 — wintergreen, 838.
 — — artificial, 811.
 — witch hazel, 1225.
- Oil, wizard, 1152.
 — woodchuck, 829.
 Oils, fatty, 846.
 — fixed, 824.
 — hair, 1281.
 — — perfumes, 1282.
 — macerated, 846.
 — medicated, 1223.
 — nitrogenized, 831.
 — nut, 830.
 — oxygenated, 831.
 — sulphurated, 831.
 — volatile, 831.
 — — other, 845.
 Ointment,
 — aconitine, 1095.
 — alkaline, 1110.
 — alum, 1110.
 — ammoniated mer-
 — cury, 1101.
 — antiperiodic, 1110.
 — aromatic, 1110.
 — astringent, 1110.
 — atropine, 1096.
 — barber's itch, 1227.
 — basilicon, 485, 1097.
 — belladonna, 1097.
 — benzoin, 1097.
 — calomel, 1104.
 — cantharides, 1098.
 — — veterinary, 1098.
 — capsicum, 1098.
 — carbolic, 1226.
 — — acid, 1105.
 — chilblain, 1174.
 — chrysarobin, 1099.
 — citrine, 1102.
 — cocaine, 1099.
 — conium, 1099.
 — creosote, 1099.
 — diachylon, 1100.
 — discutient, 1111.
 — egg, 1110.
 — Egyptian, 1110.
 — eucalyptus, 1100.
 — gall, 1100.
 — — and opium, 1100.
 — golden, 1226.
 — hamamelis, 1100.
 — healing, 1226.
 — hoof, 1264.
 — iodine, 1104.
 — iodoform, 1105.
 — itch, 1227.
 — juniper tar, 1110.
 — labdanum, 1110.
 — lanolin, 1096.
 — lead, 1106.
 — — acetate, 1106.
 — — carbonate, 1106.
 — — iodide, 1106.
- Ointment, lead
 — subacetate, 1100.
 — — tannate, 1106.
 — magnetic, 1227.
 — mercurial, 1101.
 — mercuric
 — iodide, 1102.
 — — nitrate, 1102.
 — — — diluted, 1103.
 — — oleate, 1103.
 — mercurous
 — chloride, 1104.
 — mercury, 1101.
 — — compound, 1102.
 — — diluted, 1102.
 — Mayer's, 1110.
 — nervine, 1111.
 — nutgall, 1100.
 — obstetrical, 1111.
 — paraffin, 1095, 1105.
 — petroleum, 861.
 — phenol, 1095, 1105.
 — pile, 1227.
 — potassium
 — iodide, 1106.
 — red iodide of
 — mercury, 1102.
 — — mercuric
 — oxide, 1104.
 — — precipitate, 1104.
 — resin, 1107.
 — resorcinol
 — compound, 1111.
 — ringworm, 1227.
 — rose water, 1096.
 — salicylic acid, 1095.
 — salt rheum, 1227.
 — simple, 1094.
 — skin, 1228.
 — spermaceti, 1099.
 — stavesacre, 1107.
 — stramonium, 1107.
 — — compound, 1111.
 — sulphur, 1108.
 — — iodide, 1108.
 — tannic acid, 1095.
 — tar, 1105.
 — tartar emetic, 1108.
 — tetter, 1228.
 — thymol, 1228.
 — turpentine, 1108.
 — veratrine, 1108.
 — veterinary, 1228.
 — wax, 1098.
 — white precipi-
 — tate, 1101.
 — witch hazel, 1229.
 — yellow mercuric
 — oxide, 1103.
 — zinc, 1109.
 — — oleate, 1109.

- Ointment, zinc
 oxide, 1109.
 — — stearate, 1100.
 Ointments and
 Salves, 1225, 1228.
 Ointments, com-
 pound, 1110.
 — other, 1109.
 — simple, 1110.
 Olea—Oils, 199, 824.
 Oleata—Oleates, 846.
 Oleate, aconitine, 849.
 — atropine, 847.
 — cocaine, 847.
 — copper, 849.
 — mercury, 848.
 — morphine, 849.
 — quinine, 848.
 — strychnine, 849.
 — veratrine, 848.
 Oleates, 372, 847.
 — liquid, 847.
 — of metals, 849.
 Oleatum atropinæ, 847.
 — cocainæ, 847.
 — hydrargyri, 848.
 — quininæ, 848.
 — veratrinæ, 848.
 Olefant gas, 267.
 Oleic acid, 371, 847.
 Olein, 391.
 Oleomargarine, 480.
 — Pure food laws, 480.
 Oleoresin of
 aspidium, 849.
 — capsicum, 850.
 — cubeb, 850.
 — ginger, 851.
 — lupulin, 851.
 — male fern, 849.
 — pepper, 851.
 Oleoresina
 aspidii, 132, 849.
 — capsici, 850.
 — cubeba, 850.
 — lupulini, 851.
 — piperis, 851.
 — zingiberis, 851.
 Oleoresinæ—
 Oleoresins, 849.
 Oleoresins, natural, 851.
 Oleo-saccharates, 924.
 Oleum adipis, 825.
 — æthereum, 833.
 — amygdalæ
 amaræ, 834.
 — — expressum, 825.
 — anethi, 835.
 — animale ætherum, 829.
 — anisi, 835.
 — anthemidis, 835.
 Oleum aurantii, 835.
 — — florum, 835.
 — bergamottæ, 834.
 — betulæ, 836.
 — cadinum, 836.
 — cajuputi, 836.
 — cari, 836.
 — carui, 836.
 — caryophylli, 836.
 — chenopodii, 837.
 — cinnamomi, 837.
 — cochlearia, 129.
 — cocos, 826.
 — copaiba, 837.
 — coriandri, 837.
 — crotonis, 829.
 — cubebæ, 837.
 — erigerontis, 838.
 — eucalyptus, 838.
 — fœniculi, 838.
 — gaultheriæ, 838.
 — gossypii seminis, 826.
 — hedeomæ, 838.
 — juniperi, 839.
 — lanæ, 393, 829.
 — lauri, 826.
 — lavendulæ
 florum, 839.
 — limettæ, 840.
 — limonis, 839.
 — linaloæ, 840.
 — lini, 826.
 — macidis, 840.
 — menthæ piperitæ, 840.
 — — viridis, 840.
 — morrhuæ, 826.
 — myrciæ, 841.
 — myristicæ, 841.
 — — expressum, 827.
 — olive, 827.
 — ovi vitelli, 830.
 — palmæ, 828.
 — picis liquidæ, 841.
 — pimentæ, 841.
 — pini, 841.
 — rapæ, 828.
 — ricini, 828.
 — rosæ, 842.
 — rosmarinus, 842.
 — rusci, 842.
 — rutæ, 842.
 — sabinæ, 842.
 — santali, 843.
 — sesami, 828.
 — sinapis
 expressum, 828.
 — — volatile, 843.
 — succini, 843.
 — terebinthinæ, 844.
 — — rectificatum, 844.
 — theobroma, 505.
 Oleum theobromatis, 828.
 — thymi, 844.
 — tigllii, 829.
 — valerianæ, 845.
 Old man, 130.
 — Tom gin, 1357.
 Olibanum, 199.
 — gum, 199.
 Olive oil, 827.
 Omega oil, 1224.
 One iodide elixir, 591.
 Onion, 138.
 Onosmodium
 Virginianum, 199.
 Onyx, 305.
 Opals, 305.
 Ophelic acid, 148.
 Opii pulvis, 852.
 Opium, 200, 852.
 — and ipecac
 syrup, 1022.
 — alkaloids, 854.
 — comp. powder, 908.
 — — tincture, 1217.
 — confection, 521.
 — deodoratum, 853.
 — deodorized, 200, 853.
 — — tincture, 1070.
 — elixir, 604.
 — extract, 660.
 — granulated, 200, 853.
 — granulatum, 853.
 — liniment, 769.
 — liquid extract, 699.
 — pills, 883.
 — plaster, 631.
 — powdered, 200, 852.
 — principal
 alkaloids, 854.
 — Pure Food and
 Drugs Law, 853.
 — tincture, 1067.
 — — ammoniated, 1069.
 — — camphorated, 1069.
 — vinegar, 340.
 — — aromatic, 340.
 — wine, 1118.
 Opodeldoc liquid, 770.
 Opoponax, 200.
 — gum, 200.
 Orange, 132.
 — aniline, 430.
 — bitter, peel, 132.
 — bitters, 1367.
 — — extract, 1367.
 — blossom, 1250.
 — coloring, 519.
 — comp. elixir, 604.
 — comp. spirit, 539.
 — elixir, 604.
 — essence, 1296, 1317.

Orange extract,
soluble, 1327.
— flower water, 443.
— — — stronger, 444.
— — — triple, 444.
— — oil, 835.
— flowers, 133.
— ice, 1348.
— immature fruit, 133.
— oil, 132.
— peel bitter,
tincture, 1038.
— — infusion, 753.
— — comp., 753.
— — oil, 835.
— — sweet tincture,,
sweet, peel, 132.
1038.
— phosphate syrup, 1337.
— syrup, 986, 1337.
— spirit, comp., 962.
— tincture, comp., 1038.
— wine, 1115.
Orangeade, 1340.
— syrup, 1340.
Orangette, 133.
Orpil, 204.
Ordeal bean, 205.
Oregon fir
balsam, 115, 852.
— grape root, 136.
Organic Materia
Medica, 106, 114.
Orgeat syrup, 1337.
Origanum, 200.
— oil, 200, 844.
Orismoriza longi-
stylis, 201.
Orphol, 469.
Orpiment, 255.
Orris root, 183.
— essence or ext., 1320.
— extract, 1297.
— oil, 183.
— tincture, 1297.
Orthocresol, 528.
Orthoform, 854.
Ortho-phenolsul-
phonic acid, 379.
Orthophosphoric
acid, 868.
Orthosiphon
stamineus, 200.
Oryzæ semina, 200.
— farina, 201.
— amylum, 201.
— aqua, 201.
Osmiates, 294.
Osmic acid, 294.
Osmium (element), 294.
— compounds, 294.

Osmium, salts of, 294.
Osmosis, 87.
Osmunda regalis, 201.
Ossa sepia, 201.
Ossæ, bones, 113.
Ostrya Virginica, 201.
Ottawa beer ext., 1324.
Otto of rose, 842.
Ourari, 157.
Ovi albumen, dried, 201
— siccum, 201.
Ovum, egg, 201.
Oxalates, 373.
Oxalic acid, 373.
Ox bile, purified, 666.
— gall, 167, 655.
— inspissated, 167, 666.
— prepared, 167.
— purified, 167, 666.
Oxidation, 295, 855.
Oxides, 295.
— of nitrogen, 293.
Oxyacid, 343.
Oxycollidine, 827.
Oxydendron
arboresum, 201.
Oxygen, 855.
— element, 294.
— combinations, 295.
— compounds, 295.
— group, 294.
Oxygenated oils, 831.
Oxygenium, 855.
Oxymel, 855.
— of squill, 856.
— scillæ, 856.
Oxynarcotine, 854.
Oxysuccinic acid, 380.
Ozier, green, 155.
Ozokerite, 146.
Ozone, 295, 855.

P

Pad glue, 1376.
Padding glue, 137.
Pæonia, 202.
— moutan, 202.
Pain cure or
killer, 1152.
Pain-I-Cure, 1210.
Pale rose, 213.
Palladium
(element), 295.
— compounds, 295.
— salts of, 295.
Palm oil, 828.
Palmitin, 391.
Panaceas, 1150.
Panama bark, 211.
Panax, 202.
Pancreas, 113.

Pancoast's cough
mixture, 1216.
Pancreatic solution, 789.
Pancreatin, 202, 856.
— and pepsin elixir, 605.
— elixir, 605.
— essence, 463.
— pepsin and bismuth
elixir, 605.
— saccharated, 857.
— wine, 1125.
Pancreatinum, 202, 856.
— saccharatum, 857.
Pansy, wild, 234.
Papagostin, 857.
Papain, 203, 857.
Papaverine, 854.
Papaveris capsulæ, 202.
— semina, 202.
Papaw juice, 203.
— milk, 203.
— dried, 203.
Papaya, 203.
Paper, mustard, 497.
— parchment, 87.
— potassium nitrate, 498.
Papine, 857, 1145.
Papoid, 857.
Pappoose root, 145.
Paracotoin, 156, 857.
Paracresol, 529.
Paradioxybenzo-
lum, 748.
Paraffin, 857.
— hard, 858.
— liquid, 858, 862.
— oil, 727, 845.
— ointment, 1095, 1105.
— soft, 858.
— wax, 147.
Paraffinum, 857.
— durum, 858.
— liquidum, 858, 862.
— molle, 858.
Paraform, 858.
Paraformaldehyde, 858.
Paregoric elixir, 1042.
Paraguay tea, 182.
— fluidextract, 182.
Paraldehyde, 411, 858.
Paraldehyde elixir, 606.
— Pure Food and
Drugs Law, 859.
Paraldehydum, 858.
Paramorphine, 854.
Paranephrin, 393.
Parasaccharose, 923.
Parchment paper, 87.
Paregoric, 1042, 1069.
— rapid process, 1070.
Pareira, 202.

- Pareira brava, 203, 606.
 — fluidextract, 203, 700.
 — liquid extract, 203, 700.
 — radix, 203.
 — root, 203.
 Parilla, yellow, 194.
 — fluidextract, 194.
 Paris' carminative mixture, 1216.
 Parsley, 128.
 — essence, 1317.
 — fluidextract, 128.
 — oil, 128.
 — seed, 128.
 Parthenium, 203.
 Parsley fruit, 204.
 — root, 204.
 — fluidextract, 204.
 — seed, 204.
 — oil, 204.
 Partridge-berry, 196.
 — comp. syrup, 1022.
 — fluidextract, 196.
 Paste, anatomical, 1378.
 — depilatory, 1277.
 — flour, 1378.
 — for tin, 1378.
 — library, 1378.
 Pastes, 1378.
 — massage, 1293.
 Pastilles, asthma, 1150.
 Patchouly essence, 1296.
 — perfume, 1299.
 Paullinia cupana, 176.
 Pawpaw, 131.
 Peach syrup, 1338.
 Pearl ash, 412.
 — barley, 126.
 Peat, 266.
 Pear syrup, 1338.
 Peckham's balsam, 1154.
 Pectoral, cherry, 1229.
 — drops, 1229.
 — elixir, 627.
 — pills, 1230.
 — tea, 957, 1182, 1230.
 Pectorals, 1229.
 Peerless clothes cleaner, 1382.
 — dandruff cure, 1277.
 — eczema lotion, 1292.
 — face bleach, 1267.
 — face powder, 1271.
 — grease extractor, 1382.
 — hair remover, 1278.
 — hair tonic, 1288.
 — hair water, 1279.
 — liquid soap, 1313.
 — skin food, 1293.
 — vanishing cream, 1269.
 Peerless washing fluid, 1382.
 Pelletierine, 175, 859.
 — sulphate, 859.
 — tannate, 175, 859.
 Pelletierina, 859.
 Pelletierinae sulphas, 859.
 — tannas, 859.
 Pellitory, 210.
 — fluidextract, 210.
 — root, 210.
 — tincture, 1072.
 Pencil flower, 226.
 — fluidextract, 226.
 Pelosine, 203.
 Pennyroyal, 177.
 — essence, 1317.
 — fluidextract, 177.
 — oil, 177, 838.
 Pentane, 463.
 Pentene, 428.
 Penthorium sedoides, 203.
 Pentiodides elixir, 592.
 Peony, 202.
 — fluidextract, 202.
 — tree, 202.
 Pepo, 203.
 Pepper, 207.
 — black, 207.
 — confection, 521.
 — oleoresin, 207.
 — red, 142.
 Peppermint, 194.
 — camphor, 840.
 — essence, 965, 1317.
 — lozenge, 1353.
 — oil, 195, 840.
 — spirit, 965.
 — water, 449.
 Pepsin, 113, 859.
 — and iron wine, 1126.
 — compound, 861.
 — powder, 861.
 — crystal, 860.
 — essence, 643.
 — elixir, 606.
 — elixirs comp., 607, 610.
 — glycerin, 731.
 — gum, 1354.
 — purified, 860.
 — saccharated, 860.
 — syrup, 1015.
 — wine, 1119, 1125.
 Pepsinum, 859.
 — saccharatum, 860.
 Pepsinwein, 1119.
 Peptonized koumiss, 764.
 — milk, 764.
 Peptones, 861.
 Percolation, 98.
 Percolation; directions for, 99.
 — economy in, 101.
 — history of, 99.
 — water-bath, 102.
 Percolator, water-bath, 102.
 Perfume bases, synthetic, 1303.
 — essences, 1296.
 Perfumer's alcohol, 409.
 Perfumes, 1294-1310.
 — colorings for, 1307.
 — fixers for, 1306.
 — for hair oil, 1282.
 — handkerchief, 1294.
 — synthetic, 1300.
 Periodic arrangement, elements, 240.
 — groups, chemical 240.
 — table, Mendeleeff's, 240.
 Peronine, 854.
 Perosmic acid, 872.
 Peroxide of benzoyl-acetyl, 331.
 Persea gratissima, 204.
 Persian sherbet, 1339.
 Persica, 204.
 Persico oil, 204.
 Peach, 204.
 — leaves, 204.
 — fluidextract, 204.
 Persimmon, 160.
 — Japanese, 160.
 — fluidextract, 160.
 Persio, 204.
 Peru balsam, 134.
 Peruvian bark, 149, 507.
 — beer extract, 1325.
 — bitters, 1367.
 — extract, 1367.
 — tonic, 1245.
 Petit grain, 133.
 Petrolatum, 861, 862.
 — album, 862.
 — liquid, 862.
 — white, 862.
 Petroleum benzin, 463.
 — purified, 466.
 — emulsions, 639.
 — emulsion with hypophosphites, 639.
 — ether, 463, 863.
 — ointment, 861.
 — refined, 863.
 Petroselinifructus, 204.
 Petroselinum, 204.
 — radix, 204.
 — fluidextract, 204.
 Pewter, 253.

- Pharmaceutical signs, 21.
 — prefixes, 23.
 — terms and definitions, 31.
 Phenacetin, 332, 864.
 — with caffeine, 1190.
 Phenacetinum, 864.
 Phenazone, 433, 864.
 Phenazonum, 433, 864.
 Phenetidín, 865.
 — amido-aceto
 hydrochloride, 866.
 — amygdalate, 866.
 — citrate, 866.
 — quinine-carbonic-
 ester, 866.
 — tartrate, 866.
 Phenic acid nascent
 syrup, 1015.
 Phenocoll hydro-
 chloride, 866.
 — salicylate, 925.
 Phenogams, 108.
 Phenol, 351, 864, 866.
 — glycerite, 731.
 — or carbolic acid, 510.
 — liquefied, 352, 865.
 — liquefactum, 865.
 — lozenge, 1089.
 — ointment, 1095, 1105.
 — propyl-alcohol, 904.
 — sodique, 1384.
 Phenolphthaleín, 865.
 Phenolpyrin, 865.
 Phenolsalyl, 865.
 Phenol-salicylic
 acid, 925.
 Phenyl, 866.
 — -ethyl-ketone, 331.
 — -ethyl-urethane, 646.
 — -hydrazin hydro-
 chloride, 867.
 — hydride, 464.
 — -propyl
 cinnamate, 134.
 — salicylate, 867, 925.
 Phenylacetamide, 329.
 Phenylamine, 429, 866.
 Phenyl-dimethyl-
 pyrazolon, 433.
 Phenylis salicylas,
 867, 925.
 Philonium
 Romanum, 1030.
 Phoradendron, 205.
 Phosote, 528.
 Phosphate acid, 1138.
 — calcium syrup, 1015.
 — combinations
 syrups, 1016.
 — drinks, 1338.
 Phosphate syrups, 1338.
 Phospates, 297, 375.
 — acid, 376.
 — comp. concentrated
 solution, 952.
 — comp. solution, 952.
 — comp. syrup, 1017.
 — elixir comp., 610.
 — of iron, quinine and
 strych. elixir, 581.
 — of iron, quinine and
 strychnine
 glycerite, 730.
 Phosphites, 297, 376, 868.
 Phospho-muriate
 quinine comp., 1245.
 Phosphoric acid, 373.
 — — concentrated, 375.
 — — diluted, 375.
 — — elixir, 610.
 — — glacial, 374.
 — — monobasic, 375.
 Phosphorized cod liver
 oil, 1224.
 Phosphorol, 1224.
 Phosphorous acid, 376.
 Phosphorus, 867.
 — (element), 295.
 — acids of, 297, 868.
 — allotropic forms,
 296, 867.
 — amorphous, 867.
 — and nux vomica
 elixir, 611.
 — black, 868.
 — chloride, 868.
 — combinations,
 296, 868.
 — comp. tincture, 1071.
 — elixir, 611.
 — — compound, 611.
 — etherate, 398.
 — hydride, 868.
 — iron, quinine and
 strych. elixir., 612.
 — oxides, 868.
 — pills, 883.
 — red, 867.
 — white, 868.
 Phosphotal, 528.
 Phytolacca comp.
 syrup, 1022.
 Physalin, 205.
 Physalis, 205.
 Physostigma, 205, 869.
 — extract, 661.
 — semina, 205, 869.
 — tincture, 1071.
 Physostigmina, 205, 869.
 Physostigminæ sali-
 cylas, 869.
 Physostigminæ
 sulphas, 869.
 Physostigmine,
 205, 641, 869.
 — discs of, 766.
 — salicylate, 869.
 — sulphate, 869.
 Phytolacca, 205.
 — fluidextract, 700, 1223.
 Phytolaccæ fructus, 205.
 — radix, 205.
 Phytolaccin, 206.
 Phytosylin, 912.
 Picea, 114.
 Pichi, 206.
 — and saw palmetto
 comp. elixir, 612.
 — comp. elixir, 612.
 — folia, 206.
 — fluidextract, 206.
 — leaves, 206.
 Pichurunt semina, 206.
 — beans, 206.
 Picra, 123.
 Picræna excelsa, 210.
 Picraconitine, 388.
 Picramine, 143.
 Picrates, 376.
 Picric acid, 376.
 Picrol, 920.
 Picrotoxin, 870.
 Picrotoxinum, 870.
 Pile ointment, 1227.
 Pilocarpina, 206, 870.
 — hydrochloride, 870.
 — nitrate, 871.
 Pilocarpinæ nitras, 871.
 — hydrochloridum, 870.
 Pilocarpine, 206, 870.
 Pilocarpus, 206, 871.
 — elixir, 598.
 — fluidextract, 700.
 — tincture, 1062.
 Pill, blue, 809, 882.
 — aloes and
 asafetida, 877.
 — calomel comp., 882.
 — colocynth comp., 880.
 — driers, 873.
 — excipients, 873.
 — gamboge comp., 879.
 — iron, 880.
 — -making conven-
 iences, 872.
 — asafetida comp., 882.
 — Barbados aloes, 877.
 — colocynth and
 hyoscyamus, 880.
 — galbanum comp., 882.
 — ipecacuanha with
 squill, 882.

- Pill, lead with opium, 884.
 — mercurous chloride compound, 882.
 — mercury, 882.
 — phosphorus, 883.
 — Plummer, 882.
 — quinine sulph., 884.
 — scammony comp., 885.
 — soap comp., 885.
 — Socotrine aloes, 877.
 — squill comp., 885.
 Pills, aloes, 877.
 — — and iron, 878.
 — — and mastic, 878.
 — — and myrrh, 878.
 — asafetida, 887.
 — Beecham's, 1258.
 — Blancard, 881.
 — Blaud's, 880.
 — cathartic comp., 879.
 — — improved, 878.
 — — vegetable, 879.
 — chalybeate, 880.
 — coating, 875.
 — cough, 1230.
 — female, 1198.
 — ferrous carb., 880.
 — ferrous iodide, 881.
 — gelatin coating, 876.
 — gilding, 876.
 — Holloway's, 1258.
 — kidney, 1207.
 — laxative comp., 882.
 — making, 875.
 — official, 877.
 — opium, 883.
 — podophyllum, belladonna and capsicum, 884.
 — rhubarb comp., 884, 885.
 — silvering, 876.
 — sugar coating, 876.
 Pilula aloes et asafetida, 877.
 — — Barbadosensis, 877.
 — — et ferri, 878.
 — — et myrrhæ, 878.
 — — Socotrina, 877.
 — colocynthis composita, 880.
 — — et hyoscyami, 880.
 — ferri, 880.
 — galbani comp., 882.
 — hydrargyri, 882.
 — — subchloridi, 882.
 — ipecacuanhæ cum phosphori, 883.
 — quiniæ sulph., 884.
 — rhei comp., 885.
 Pilula saponis compoſtius, 885.
 — scammonii comp., 885.
 — scilla, 882.
 Pilulæ—Pills, 871.
 — aloes, 877.
 — — et ferri, 878.
 — — et mastiches, 878.
 — — et myrrhæ, 878.
 — asafetida, 878.
 — cathartica comp., 879.
 — — vegetabilis, 879.
 — — ferri carbonatis, 880.
 — ferri iodidi, 881.
 — laxativa comp., 882.
 — opii, 883.
 — phosphori, 883.
 — plumbi cum opio, 884.
 — podophylli, belladonna et capsici, 884.
 — rhei comp., 885.
 Pimenta, 206.
 Pimento, 206.
 — essence, 1318.
 — oil, 206, 841.
 — water, 450.
 Pimpernel, 206.
 — fluidextract, 206.
 Pinchbeck, 271.
 Pine oil, 841.
 — white, 207.
 — — fluidextract, 207.
 Pineapple ice, 1348.
 — oil, 479.
 — phosphate syrup, 1338.
 — syrup, 1338.
 Pinit, 923.
 Pink and senna, 224.
 — saucers, 143.
 Pinkroot, 224.
 — fluidextract, 224.
 — comp. elixir, 612.
 Pinus balsamea, 114.
 — canadensis, 115.
 — — extract, 1192.
 — picea, 113.
 — pumilio oil, 841.
 — strobilus, 207.
 Pip or pep menthol, 811.
 Piper, 207.
 — nigrum, 207.
 Piperazidine, 885.
 Piperazine, 885.
 — quinate, 886.
 — salicylate, 886.
 — sulphoichthyolate, 886.
 Piperazinum, 885.
 Piperidine
 bitartrate, 886.
 — guaiacolate, 886.
 Piperina, 207, 886.
 Piperine, 207, 886.
 Piperonal, 1301.
 Pipsissewa, 148.
 — fluidextract, 148.
 Piscidia, 207.
 Piscidia radix, 207.
 Piscidin, 207.
 Pitch, 886.
 — Burgunda, 115.
 — Burgundy, 886.
 — black, 888.
 — Canada, 887.
 — hemlock, 887.
 — plaster, 632.
 — white pine, 887.
 Pitchblend, 301.
 — (uranium oxide), 320.
 Pitcher plant, 219.
 — — fluidextract, 219.
 Pix—Pitch, 886.
 Pix Burgundica, 115, 886.
 — Canadensis, 115, 887.
 — carbonis præparata, 887.
 — juniperi, 887.
 — lithanthracis, 888.
 — liquida, 887.
 — navalis, 888.
 — nigra, 888.
 — pini, 887.
 Pixol, 888.
 Plant food, 1387.
 Plants, 111.
 Plantain, 207.
 — fluidextract, 207.
 Plantation bitters, 1156.
 Plantago major, 207.
 Plaster, adhesive, 628.
 — ammoniacum and mercury, 629.
 — antimonial, 633.
 — belladonna, 629.
 — blistering, 495.
 — camphor, 633.
 — cancer, 634.
 — cantharides, 630.
 — capsicum, 630.
 — corn, 634, 1173.
 — court, 631.
 — dentist's, 264.
 — isinglass, 631.
 — lead, 632.
 — — iodide, 633.
 — menthol, 631.
 — mercurial, 630.
 — opium, 631.

- Plaster of Paris, 264, 487.
 — pitch, 632.
 — resin, 628, 633.
 — soap, 633.
 — warming, 630.
 Plasters, 628-634.
 — adhesive, 628.
 — unofficial, 633.
 Platinic oxide, 889.
 Platinous oxide, 889.
 Platinum, 888.
 — (element), 888.
 — black, 888.
 — chloride, 889.
 — oxides, 889.
 — sponge, 889.
 — spongy, 889.
 Pleurisy root, 131.
 Plumbi acetat, 889.
 — carbonas, 890.
 — iodidum, 890.
 — nitras, 891.
 — oxidum, 891.
 Plumbum, 281.
 Plumbum—Lead, 889.
 — (element), 281.
 Plummer's pill, 882.
 Podophylli, 918.
 — rhizoma, 207.
 Podophyllin, 918.
 Podophyllum, 207.
 — belladonna and capsicum pill, 884.
 — comp. elixir, 602.
 — fluidextract, 701.
 — resin, 208, 918.
 — root, 207.
 — tincture, 1072.
 Pœonin, 430.
 Poison ivy, 213.
 — oak, 213.
 Poisons for insects, 1385.
 Poke, 205.
 — berries, 205.
 — fruit, 205.
 — comp. syrup, 1022.
 — fluidextract, 205, 700, 1223.
 — root, 205.
 Polemonium, 208.
 Polisher's putty, 319.
 Pollux, 262.
 Polyform liniment, 1213.
 Polygalic acid, 222.
 Polygonatum, 208.
 Polygonum, 208.
 Polymnia, 208.
 Polymniæ radix, 208.
 Polypodii rhizoma, 208.
 Polypodium, 208.
 Polypody, 208.
 Polytrichum, 208.
 Pomade, barber's, 1283.
 — hair grower, 1280.
 — Hongroise, 1283.
 — pour le toucher, 1111.
 — massage, 1293.
 — for hair, 1282.
 — from flowers, 1295.
 — stick, 1283.
 Pomegranate, 174.
 — bark, 174.
 — — decoction, 533.
 — fluidextract, 174, 675.
 Pomelo syrup, 1336.
 Pond lily, white, 199.
 — — fluidextract, 199.
 — — yellow, 198.
 Poor man's bitters, 1160.
 Poplar, white, 208.
 — — fluidextract, 208.
 — buds, 208.
 Poppy, California, 165.
 — — fluidextract, 165.
 — capsules, 202.
 — oil, 202.
 — seed, 202.
 Populi gemmæ, 208.
 Populus, 208.
 — candicans, 208.
 — tremuloides, 208.
 Porcelain cement, 1375.
 Porphyrine, 124.
 Portulaca, 209.
 Port wine, 1365.
 — — essence, 1364.
 Potash, 412.
 — caustic, 892.
 — prussiate, yellow, 899.
 — solution, 791.
 Potassa, 299, 899.
 — caustica, 892.
 — cum calce, 892.
 — sulphurata, 893.
 — sulphurated, 893.
 — with lime, 892.
 Potassii acetat, 893.
 — bicarbonas, 893.
 — bichromas, 894.
 — bitartras, 895.
 — bromidum, 895.
 — carbonas, 895.
 — citras, 897.
 — — effervescent, 897.
 — cyanidum, 897.
 — dichromas, 898.
 — et sodii tartras, 898.
 — ferrocyanidum, 899.
 — hydroxidum, 899.
 — hypophosphis, 900.
 — iodidum, 900.
 Potassii nitras, 901.
 — permanganas, 902.
 — sulphas, 903.
 — tartras, 903.
 — — acidus, 895, 903.
 Potassium
 (element), 297.
 Potassium—Kalium, 891.
 — acetat, 893.
 — — elixir, 612.
 — -alum, 417.
 — and sodium
 tartrate, 898.
 — arsenite solution, 791.
 — bicarbonate, 893.
 — bichromate, 894.
 — bitartrate, 895, 903.
 — bromide, 895.
 — — and hydrated
 chloral elix., 613.
 — — elixir, 612.
 — — comp. elixir, 613.
 — carbonate, 895.
 — chlorate, 895.
 — — troches, 1092.
 — chromate, red, 894.
 — citrate, 897.
 — — effervescent, 897.
 — — solution, 791, 952.
 — combinations, 297.
 — cyanide, 897.
 — dichromate, 898.
 — ferrocyanide, 899.
 — hydrate, 892, 899.
 — hydrogen car-
 bonate, 893.
 — hydroxide, 892, 899.
 — — solution, 792.
 — hypophosphite, 900.
 — iodide, 900.
 — iodide elixir, 614.
 — — — comp., 1203.
 — — ointment, 1106.
 — — with soap lin-
 iment, 769.
 — nitrate, 901.
 — — paper, 498.
 — permanganate, 902.
 — — solution, 792.
 — quadroxalate, 373.
 — salts of, general,
 297.
 — salts, other, 904.
 — sulphate, 903.
 — tartrate, acid, 895.
 — — neutral, 903.
 — — normal, 903.
 Potassio-ferric
 tartrate, 670.
 Potpourri for rose
 jar, 1310.

- Powder, acetanilide comp., 904.
 — almonds comp., 904.
 — antiseptic, 1146.
 — antimonial, 904.
 — aromatic, 905.
 — baking, 1380.
 — — acid phos., 1380.
 — — alum, 1380.
 — — tartaric acid, 1380.
 — bitters, 1161.
 — bloom of Ninon, 1271.
 — catarrhal, 1164.
 — catechu comp., 905.
 — chalk and opium, 905.
 — — aromatic, 905.
 — — compound, 906.
 — cinnamon comp., 906.
 — depilatory, 1277.
 — Dover's, 907.
 — effervescing comp., 906.
 — eletarin comp., 906.
 — fineness of, 83.
 — flesh, face, 1270.
 — glycyrrhiza comp., 906.
 — Gregory's, 908.
 — hog cholera, 1262.
 — invisible face, 1271.
 — ipecacuanha comp., 907.
 — jalap comp., 907.
 — James', 904.
 — kino comp., 907.
 — liquorice comp., 906.
 — morphine comp., 908.
 — nail toilet, 1294.
 — of Algorath, 253.
 — opium comp., 908.
 — peerless face, 1271.
 — rhubarb comp., 908.
 — rose or violet, 1271.
 — salicylic acid and talc, 909.
 — scammony comp., 909.
 — talcum toilet, 1271.
 — tartarated soda effervescent, 909.
 — theatre, white, 1271.
 — tragacanth, comp., 909.
 — Tully's, 908.
 Powdered milk, 764.
 — opium, 852.
 Powders, baking, 1379.
 — condition, 1261.
 — disinfecting, 1383.
 — hair, 1284.
 — headache, 1200.
 — heave, 1262.
 Powders, ink, 1991.
 — poultry, 1263.
 — sachet, 1310.
 — seidlitz, 906, 909.
 — veterinary, 1261.
 Praseodymium (element), 301.
 — salts of, 301.
 Prayer-beads, 116.
 Precipitated chalk, 484.
 — sulphur, 314.
 Precipitates, washing, 103.
 Precipitation, 103.
 Prefixes, Med. and Pharm., 23.
 Preparations, Adhesive, 1373.
 — Heart, 1200.
 Prepared coal tar, 887.
 — chalk, 484.
 — storax, 972.
 — suet, 932.
 — wine, 1120.
 — wines, 1365.
 Preston's salts, 1312.
 Prickly ash, 235.
 — — fluidextract, 235, 710.
 — elder, 129.
 — — fluidextract, 129.
 Primary alcohols, 400.
 Primrose, evening, 199.
 — — fluidextract, 199.
 Prince Rupert's metal, 271.
 Prince's pine, 148.
 Prinos, 209.
 — cortex, 209.
 Principles of opium, 854.
 Processes, working, 81.
 Proof spirit, 403.
 — of spirits, 403.
 — vinegar, 336.
 Propylamine, 904.
 — salicylate elixir, 614.
 Propylbenzene, 464.
 Propylic alcohol, 904.
 Prophylactic vinegar, 336.
 Propylenyl, 415.
 Proprietary medicines, 1137.
 Propyl or trityl, 904.
 Protargol, 455.
 Protopine, 854.
 Protoxide of iron elixirs, 614.
 — — syrup, 1018.
 Prune or plum syrup, 1338.
 Prunes, 209.
 Pruni Virginianæ, 209.
 Prunin, 209.
 Prunum, 209.
 Prunus Virginiana, 209.
 Prussian blue, 280, 299.
 Prussiates, 364.
 Prussic acid, 364, 531.
 Prussiate of potash, yellow, 899.
 Pseud-aconine, 388.
 Pseud-aconitine, 388.
 Pseudo-morphine, 854.
 Ptelea, 209.
 Ptelein, 209, 921.
 Pterocarpis lignum, 218.
 Ptyalin, 536.
 Pullna water, solution, 1346.
 Pulmonaria, 209.
 — fluidextract, 209.
 Pulp, cassia, 144.
 Pulque, 212.
 Pulsatilla, 209.
 — tincture, 1072.
 Pulveres—Powders, 904.
 Pulvis acetanilidi comp., 904.
 — amygdalæ comp., 904.
 — antimonialis, 904.
 — aromaticus, 905.
 — catechu comp., 905.
 — cinnamomi comp., 905.
 — cretæ aromat-icus, 905.
 — — cum opio, 905.
 — — comp., 906.
 — effervescens comp., 906.
 — elaterini comp., 906.
 — glycyrrhizæ comp., 906.
 — ipecacuanhæ comp., 907.
 — jalapæ comp., 907.
 — kino comp., 907.
 — morphinæ comp., 908.
 — opii comp., 908.
 — rhei comp., 908.
 — salicylicus cum talco, 909.
 — scammonii comp., 909.
 — sodæ tartaratæ effervescens, 909.
 — tragacanthæ comp., 909.
 Pumpkin seed, 203.
 Punch drinks, 1344.
 — grape juice, 1345.

Pungents, 1311.
 Purgamenta, 1230.
 Purgative preparations, 1230.
 Purgen, 865, 1230.
 Purglets, 1230.
 Purifiers, blood, 1161.
 Purslane, 209.
 — fluidextract, 209.
 Pycnanthemum, 210.
 Pycnometers, 72.
 Pyoktannin, 430.
 Pyramidon, 909.
 — camphorate, acid, 910.
 — — neutral, 910.
 — salicylate, 910.
 Pyrene, 888.
 Pyrethri flores, 210.
 — radix, 210.
 Pyrethrine, 210.
 Pyrethrum, 210.
 — fluidextract, 210.
 — root, 210.
 — tincture, 1072.
 Pyridina, 910.
 Pyridine, 510, 910.
 — tannate, 910.
 Pymont water, solution, 1347.
 Pyroacetic spirit, 330, 968.
 Pyroboric acid, 475.
 Pyrocatechin, 888.
 Pyrocin, 342.
 Pyrodone, 910.
 Pyrogallie acid, 910.
 Pyrogallol, 910.
 — diacetate, 911.
 — monacetate, 911.
 — oxidized, 911.
 — triacetate, 911.
 Pyroguaiacin, 176.
 Pyrolean lithanthracis, 888.
 Pyrolusite, 287.
 Pyrometers, 78.
 Pyroxylic spirit, 968.
 Pyroxylin, 911.
 Pyroxylinum, 911.
 Pyrus malus, 210.

Q

Quassia, 210.
 — extract, 662.
 — fluidextract, 701.
 — infusion, 754.
 — lignum, 210.
 — solution, conc., 792.
 — tincture, 1073.
 — wood, 210.
 Quassin, 211, 223.

Quebracho, 132.
 — tincture, 1073.
 Queen's root, 225.
 — — com. syrup, 1023.
 — — fluidextract, 707.
 Quercit, 923.
 Quercitrin, 211.
 Quercitrose, 923.
 Quercus alba, 211.
 — fluidextract, 702.
 Quicksilver, 288.
 Quieting syrup, 1239.
 Quillaja, 211.
 — bark, 211.
 — fluidextract, 702.
 — sea foam, 1287.
 — tincture, 1074.
 Quillaia cortex, 211.
 Quince syrup, 1338.
 Quinia, 912.
 — Laroche tonic, 1245.
 Quinidia, 912.
 Quinidina, 912.
 Quinidine, 912.
 — sulphate, 912.
 Quinina, 912.
 Quinine, 498, 912.
 — and morphine bromide syrup, 1006.
 — bisulphate, 913.
 — bromide syrup, 1006.
 — cincho-, 915.
 — comb. syrups, 1016.
 — comp. elixirs, 615.
 — dextro-, 915.
 — elixir, 615.
 — flower, 216.
 — hospital, 915.
 — hydrobromide, 913.
 — hydrochloride, 914.
 — — acid, 914.
 — oleate, 848.
 — salicylate, 914.
 — sulphate, 915.
 — — pill, 884.
 — sweet, 915.
 — syrup, tasteless, 1018.
 — tincture, 1074.
 — — ammoniated, 1074.
 — wine, 1116, 1119.
 Quinina bisulphas, 913.
 — hydrobromidum, 913.
 — hydrochloridum, 913.
 — — acidum, 914.
 — salicylas, 914.
 — sulphas, 915.
 Quinidina sulphas, 912.
 Quinoidin, 508.
 Quinol, 748.

Quinoline, 498, 916.

R

Radicals, alcohol, 400.
 Radices—Roots, 211.
 Radium (element), 301.
 — compounds, 301.
 — salts of, 301.
 Ragweed, 124.
 Raisins, 232.
 Rape seeds oil, 828.
 Raspberry, 214.
 — fluidextract, 214.
 — juice, 214.
 — leaves, 214.
 — phosphate, 1339.
 — syrup, 998, 1338.
 — vinegar, 341.
 — wine, 1365.
 Rat poison, 1386.
 — paste poison, 1386.
 Ready balm or relief, 1152.
 — oil liniment, 1213.
 — relief, 1210.
 Realgar, 255.
 Réamur scale, 78.
 Rectal suppositories, 979.
 Rectified spirit, 403, 966.
 Red aniline, 430.
 — carmine, 518.
 — clover blossoms, 230.
 — — fluidextract, 230.
 — — comp. syrup, 1237.
 — cochineal coloring, 518.
 — — fruit acid, 518.
 — cudbear, 518.
 — elixir, 617.
 — gum, 165.
 — — lozenge, 1090.
 — iodide of mercury, 743.
 — mercuric oxide ointment, 1104.
 — oil, 847.
 — oxide of mercury, 744.
 — pepper, 142.
 — phosphorus, 867.
 — poppy petals, 213.
 — — syrup, 998.
 — precipitate, 744.
 — — ointment, 1104.
 — root, 145.
 — — comp. syrup, 1021.
 — rose, 214.
 — — fluidextract, 214.
 — — petals, 214.
 — saunders wood, 218.

- Red wine, 1120.
 — wine, artificial, 1363.
 — wines, 1361.
 Reduced iron, 678.
 — — lozenge, 1090.
 Refined petrolatum, 863.
 — sugar, 922.
 Refrigeration, 104.
 Regulator, heart, 1200.
 Regulus of
 antimony, 431.
 Relief, asthma, 1149.
 — golden, 1211.
 Remedy, catarrh, 1164.
 — favorite female, 1197.
 Remedies, cholera, 1264.
 — colic, 1264.
 — consumption, 1178.
 — corn and bun-
 ion, 1172.
 — cough, 1174-1183.
 — diarrhoea and
 dysentery, 1184.
 — dyspepsia, 1185-1187.
 — earache, 1187.
 — feet, 1195.
 — female, 1196-1198.
 — for baldness, 1276.
 — for dandruff, 1277.
 — hay fever, 1199.
 — headache, 1200.
 — liver and kidney,
 1204-1208.
 — obesity, 1223.
 — rheumatic, 1231.
 — standard, 1137.
 — tape worm, 1256.
 — tooth-ache, 1246-1249.
 Remover, hair, 1278.
 Renewer, hair, 1284.
 Rennet liquid, 1257.
 Renovator, hair, 1285.
 Requisites, soda
 water, 1328.
 Resina, 916.
 — copaiba, 917.
 — draconis, 218.
 — jalapa, 917.
 — podophylli, 918.
 — scammonii, 918.
 Resinæ—Resins, 916.
 Resinæ jalapa, 761, 917.
 Resin, 916.
 — copaiba, 917.
 — jalap, 761, 917.
 — ointment, 1107.
 — plaster, 628, 633.
 — podophyllum,
 208, 918.
 — scammonv. 918.
 Resinoids, 920.
 Resinoids, general
 formula, 920.
 Resol, 888.
 Kesopyrin, 920.
 Kesorcin, 919.
 — —camphor, 920.
 — —phtalein, 920.
 Resorcinol, 125, 919.
 — comp. ointment, 1111.
 Restoratives, hair, 1284.
 Ketinol, 917.
 Rex magnus
 specihc, 1241.
 Rhamnin, 212.
 Rhamnus
 catharticus, 212.
 — Purshiana, 212.
 — — cortex, 143.
 Rhatanine, 186.
 Rhatany, 186.
 — extract, 186, 657.
 — fluidextract, 186, 697.
 — root, 186.
 — suppository, 982.
 — tincture, 1063, 1074.
 Rheum, 212.
 Rheumatic bitters, 1233.
 — elixir, 1233.
 — liniment, 1213.
 — remedies, 1231-1333.
 — tea, 1233.
 Rhei radix, 212.
 Rhinewine, 1365.
 — essence, 1364.
 Rhizoma—Rhizome,
 213, 921.
 Rhizomæ curcumæ, 157.
 Rhodalin, 1931.
 Rhodeoretin, 184, 761.
 Rhœadine, 854.
 Rhœados petala, 213.
 Rhodium (element), 302.
 — combinations, 302.
 — salts of, 302.
 Rhodinol, 1302.
 Rhodium oil, 846.
 Rhigolene, 863.
 Rhubarb, 212.
 — and columbo
 elixir, 616.
 — and magnesia
 elixir, 616.
 — and potassium
 syrup, 1022.
 — — comp. elixir, 617.
 — and soda mixture, 815.
 — comp. pills, 885.
 — comp. powder, 908.
 — elixir, 616.
 — extract, 663.
 — — compound, 663.
 Rhubarb fluid-
 extract, 212, 703.
 — infusion, 754.
 — solution conc., 792.
 — soothing syrup, 1239.
 — syrup, 997.
 — — aromatic, 997.
 — tincture, 1075.
 — — aromatic, 1075.
 — — compound, 1076.
 — — spiced, 1075.
 Rhus giabra, 213.
 — — fluidextract,
 213, 703.
 — succedaneum, 146.
 — toxicodendron, 213.
 — — tincture, 213.
 Ribbon inks, 1391.
 Rice, 126, 200.
 — flour, 201.
 — starch, 201.
 — water, 201.
 Richard's chalk
 mixture, 1216.
 Ricini folia, 213.
 — — fluidextract, 213.
 — oleum, 213.
 — semina, 213.
 — — fluidextract, 213.
 Ricinus, 213.
 Riesling wine
 essence, 1364.
 Ringworm oint-
 ment, 1227.
 Roborans elixir, 627.
 Rochelle salt, 898, 933.
 Rock and rye, 1360.
 Rock oil, 846.
 Roman punch
 essence, 1372.
 — — syrup, 1339.
 Root, alkanet, 126.
 — angelica, 127.
 — beer extract, 1325.
 — colic, 122.
 — unicorn, 122.
 Roots, 112.
 Rosa centifolia, 213.
 — Gallica, 214.
 Rosæ gallicæ
 petala, 214.
 Rosalic acid, 429.
 Rose bandoline, 1265.
 — essence, 1296, 1318.
 — fluidextract, 704.
 — geranium essence,
 1296.
 — honey, 810.
 — jar potpourri, 1310.
 — oil, 842.
 — otto, 842.

Rose, pale, 213.
 — pink, 216.
 — sachet, 1310.
 — syrup, 998.
 — tooth-powder,
 1275, 1271.
 — triple extract, 1295.
 — wash injection, 1203.
 — water, 450.
 — — ointment, 1096.
 — — stronger, 451.
 — — triple or
 quadruple, 451.
 Roses, bloom of, 1267.
 — confection, 522.
 — cream of, 1266.
 — infusion, 754.
 — syrup, 998.
 — vinegar, 340.
 Rosemary, 214.
 — comp. liniment, 1107.
 — essence, 1296, 1318.
 — fluidextract, 214.
 — leaves, 214.
 — oil, 214, 842.
 — spirit, 967.
 — vinegar, 339.
 — wild, 188.
 Rosin, 228, 916.
 Rottlera tinctora, 185.
 Rouge, 280.
 — liquid, 518.
 Roxa tonic, 1246.
 Rosin cerate, 495.
 — — compound, 496.
 — oil, 917.
 — weed, 223.
 — — fluidextract, 223.
 Rosmarinsalbe, 1107.
 Rosmarinus, 214.
 Rubber, 141, 162.
 — hard, 162.
 — Para, 141.
 — tire cement, 1374.
 — vulcanized, 162.
 Rubia, 214.
 Rubidium (element), 303.
 — combinations, 303.
 — salts of, 303.
 Rubrum elixir, 617.
 Rubus, 214.
 — fluidextract, 704.
 — Idæus, 214.
 — syrup, 998.
 Ruby oriental, 247.
 — sulphur, 255.
 Rudbeckia lancinata, 215.
 — purpurea, 215.
 Rue, 215.
 — fluidextract, 215.
 — goat's, 170.

Rue oil, 842.
 — vinegar, 339.
 Rum, 1358.
 — artificial, 1358.
 — bay, 966.
 — cocktail, 1368.
 — essence,
 Jamaica, 1358.
 Rumex acetosella, 215.
 — comp. syrup, 1023.
 Ruta, 215.
 Rutæ folia, 215.
 Ruthenium
 (element), 303.
 — combinations, 303.
 — salts of, 303.
 Rutin, 215.
 Russian cholera
 drops, 1172.
 Rye and rock, 1360.

S

Sabadilla, 215.
 — fluidextract, 215.
 Sabadilline, 215.
 Sabal, 215.
 Sabbatia, 216.
 Sabina, 216.
 Sacchara—Sugars, 921.
 Saccharated lime
 solution, 776.
 — pepsin, 860.
 — pancreatin, 857.
 — spermaceti, 147.
 Saccharates, 924.
 Saccharatum
 lactis, 923.
 Saccharin, 466, 723.
 — elixir, 586.
 — solution, 953.
 Saccharine, 924.
 — substances, 923.
 Saccharoids, 921.
 Saccharose, 921.
 Saccharoses, 923.
 Saccharum, 216, 922.
 — lactis, 765.
 — purificatum, 922.
 Sachet powders, 1310.
 — — base for, 1310.
 Sacred bark, 143, 212.
 Safröl, 924.
 Safrölum, 924.
 Saffron, 156.
 — orange, 519.
 — tincture, 156, 1052.
 Sage, 126, 217.
 — essence, 1318.
 — mountain, 130.
 — oil, 217.
 Sagepenum, 216.
 Sal absinthii, 117.
 — acetosella, 298.
 — ammoniac, 424.
 — hepatica, 1235.
 — nitre, 901.
 — prunelle, 901.
 — succini volatili, 379.
 — tartar, 895.
 — volatile, 423.
 Salacetol, 331, 925.
 Salad oil, 827.
 Salep, 216.
 — tubera, 216.
 Salicinum, 217.
 Salicin, 217, 924.
 Salicoll, 925.
 Salicyl, 924.
 — acetal, 925.
 — bromanilid, 435.
 Salicylamide, 925.
 Salicylates, 378.
 Salicylatrenpulver, 909.
 Salicylic acid, 377.
 — — comp. collodion,
 516.
 — — — elixir, 618.
 — — and talc
 powder, 909.
 — — ointment, 1095.
 — ether, 644.
 — mouth water, 1276.
 — tooth-ache cure, 1248.
 Salicylica rheumatic
 remedy, 1232.
 Salicylol, 925.
 Salicylous acid, 925.
 Salicynum, 924.
 Saliformin, 925.
 Saligallol, 911.
 Saligenin, 924.
 Sali-naphthol, 468.
 Salipyrine, 435.
 Salithymol, 1032.
 Salix, 216.
 Salochinin, 925.
 Salol, 867, 925.
 — antipyrine, 435.
 — camphor, 926.
 — rheumatic
 remedy, 1233.
 Salophen, 342, 925.
 Saloquinine, 925.
 Salt, artificial
 Carlsbad, 1191.
 — common salt, 938.
 — crab-orchard, 1234.
 — — — efferves-
 cent, 1190.
 — effervescent
 Kissingen, 1190.
 — Epsom, 805.

- Salt, fruit or grape, 1234.
 — Glauber's, 943.
 — hepatic, 1235.
 — of tartar, 895.
 — rheum ointment, 1227.
 — Vichy, 1191.
 Saltpetre, 300, 901.
 Salts, amorphous, 87.
 — Carlsbad
 artificial, 1234.
 — effervescent,
 1188, 1191.
 — Carlsbad, 1190.
 — of lemon, 300.
 — of wormwood, 117.
 — Preston's, 1312.
 — proprietary, 1233.
 — smelling, 1311.
 — of sorrel, 300.
 — of tartar, 299.
 Salumin, 925.
 Salverson, "606," 458.
 Salve, arnica, 1226.
 — carbolic, 1226.
 — catarrh, 1166.
 — corn, 1173.
 — nail toilet, 1294.
 Salves, eye, 1194.
 — lip, 1290.
 Salvia, 217.
 Salviol, 217.
 Samarium
 (element), 303.
 — combinations, 303.
 — salts of, 303.
 Sambuci flores, 217.
 Sambucus, 217.
 Sandal-wood, 218.
 — oil, 843.
 Sanguinaria, 217.
 — fluidextract,
 217, 704.
 — tincture, 1076.
 Sanguinarin, 217.
 Sanguinarine, 217.
 — nitrate, 217.
 — sulphate, 217.
 Sanguis draconis, 218.
 Sandarac, 217.
 Sandaracha, 217.
 Sanicle, 218.
 Santa Cruz rum, 1358.
 Santal oil, 843.
 — essence, 1296.
 Santalum citrinum, 218.
 — rubrum, 218.
 Santalwood oil, 218.
 — fluidextract, 218.
 — red, 218.
 — yellow, 218.
 Santiculata
 Marnandica, 218.
 Santonica, 218.
 Santonin, 218, 926.
 — troches, 1092.
 Santoninum, 926.
 Sapo, 929.
 — animatis, 929.
 — durus, 929.
 — mollis, 929.
 — viridis, 929.
 Sapoës—Soaps, 926.
 Saponaceous tooth
 paste, 1274.
 — — powder, 1275.
 — — wash, 1273.
 Saponaria, 218.
 Saponin, 218.
 Sappan, 218.
 — wood, 218.
 Sapphire, 247.
 Saponin, 211, 222.
 Sarracenia, 219.
 — flava, 219.
 Sarsæ radix, 219.
 Sarsaparilla, 219.
 — American, 129.
 — fluidextract, 219.
 — compound, 1235.
 — — concentrated, 1236.
 — — decoction, 532.
 — — elixir, 618.
 — — solution,
 conc., 793.
 — compounds, 1235.
 — essence, 1000, 1318.
 — extract soluble, 1327.
 — flavoring, 1000.
 — fluidextract, 704.
 — — compound, 705.
 — Honduras, 219.
 — Indian, 178.
 — — fluidextract, 178.
 — Jamaica, 219.
 — liquid extract, 705.
 — Mexican, 219.
 — resolvent, 1237.
 — soda syrup, 1339.
 — stillingia and red
 clover ext., 1236.
 — syrup comp., 999.
 Sassa bark, 165.
 — fluidextract, 165.
 Sassafras, 219.
 — bark, 219.
 — essence, 1318.
 — fluidextract, 219.
 — medulla, 219.
 — oil, 219.
 — pith, 219.
 — pith mucilage, 821.
 Sassafras radix, 220.
 — root, 219.
 — tea, 219.
 Satureja, 220.
 Saunders wood, red, 218.
 Savin fluidextract, 704.
 — oil, 842.
 Savana flower, 231.
 — fluidextract, 231.
 Savine, 216.
 — fluidextract, 216.
 — oil, 216.
 Saw palmetto, 215.
 — — fluidextract, 215.
 — — fruit, 215.
 — — and coca
 elixir, 619.
 — — santal comp.,
 elixir, 619.
 — — comp. elixir, 618.
 Scammonia
 resina, 220, 918.
 Scammonium, 220.
 Scammony, 220.
 — resin, 220.
 — comp. pill, 885.
 — — powder, 909.
 — confection, 522.
 — resin, 918.
 Scandium
 (element), 303.
 — combinations, 303.
 — compounds, 303.
 Schiedam schnapps,
 1357.
 Scilla, 220.
 — comp. elixir, 619.
 Scillipicrin, 221.
 Scillitin, 221.
 Sclerotic acid, 164, 378.
 Scoparii cacumina, 221.
 Scoparin, 221.
 Scoparius, 221.
 — fluidextract, 221.
 Scopola, 221, 930.
 — extract, 663.
 — fluidextract, 706.
 Scopolamina, 930.
 Scopolaminæ hydro-
 bromidum, 931.
 Scopolamine, 930.
 — hydrobromide,
 748, 930, 931.
 — hydrochloride, 930.
 — hydriodide, 931.
 — sulphate, 931.
 Scrofularia, 220.
 — fluidextract, 220.
 Scullcap, 221.
 — fluidextract, 221, 706.
 Scurvy-grass, 152.

- Scurvy-grass con-
 fection, 520.
 Scutellaria, 221.
 — fluidextract, 221, 706.
 Scutellarin, 221.
 Sea breeze
 perfume, 1299.
 Sea foam, 1287.
 Seal, Solomon's, 208.
 Sebacic ether, 644.
 Sebum bovinum, 223.
 — salicylicum, 223.
 Sedative cough
 remedy, 1180.
 — elixir, 613.
 — nervine elixir, 1220.
 Seed, anise, 127.
 — dill, 127.
 — quince, 158.
 Seeds, 112.
 Seeley's disinfecting
 solution, 1384.
 Seidlitz powders, 909.
 Selenic acid, 304.
 Selenium
 (element), 303.
 — acids of, 304.
 — combinations, 303.
 — salts of, 304.
 Selenous acid, 304.
 Seltzer aperient,
 1147, 1234.
 — water, solution, 1347.
 Semen cydoniæ, 158.
 Semina—Seeds,
 221, 931.
 Senecin, 222, 921.
 Senecio, 222.
 — fluidextract, 222.
 Senega, 222.
 — fluidextract, 222, 706.
 — infusion, 754.
 — root, 222.
 — solution, conc., 793.
 — syrup, 1001.
 — tincture, 1077.
 Senegæ radix, 222.
 Senegin, 222.
 Seneka oil, 845.
 Senna, 222.
 — Alexandria, 222.
 — alcoholized, 222.
 — fluidextract, 222.
 — comp. elixir, 620.
 — comp. mixture, 816.
 — confection, 522.
 — East India, 222.
 — elixir, 619.
 — fluidextract, 706.
 — Indica, 222.
 — infusion, 754.
 Senna infusion,
 compound, 752.
 — solution conc., 793.
 — syrup, 1002.
 — tincture comp., 1078.
 — Tinnivella, 222.
 Separation,
 methods of, 104.
 Series, aromatic, 464.
 — benzene, 464.
 — thionic, 387.
 Seronoa serrulata, 215.
 Serpentaria, 223.
 fluidextract, 707.
 Serpentariæ
 rhizoma, 223.
 — fluidextract, 223.
 Serpentry, 223.
 — infusion, 754.
 — tincture, 1078.
 — solution conc., 794.
 — tincture, 1078.
 Serum anti-
 diphtheritic, 931.
 — anti-diph-
 theriticum, 931.
 Serums, 113.
 Sesamum, 223.
 — oil, 828.
 Seven barks, 180.
 — seals, 1210.
 Sevum, suet, 113.
 — præparatum,
 223, 923.
 Shake drinks, 1342.
 Shakers' root ext., 1193.
 Shampoo liquids, 1286.
 Shampoos, 1286.
 Shaving cream, 1269.
 — — for metal
 tubes, 1269.
 Shell-bark hickory, 143.
 Shellac, 186.
 — orange, 186.
 — white, 186.
 Sheep laurel, 185.
 — — fluidextract, 185.
 Sheep sorrel, 215.
 — — fluidextract, 215.
 Shepherd's purse, 141.
 Sherbet, cream, 1348.
 — essence or ext., 1320.
 — syrup, 1339.
 Sherry wine, 1120, 1365.
 — — detannated, 1120.
 — — essence, 1364.
 Shot, black, 1215.
 Sierra salvia, 130.
 Signs used in
 pharmacy, 21.
 — botanical, 21.
 Silica, 305.
 Silicates, 305.
 Silicic acid, 305.
 Silicon (element), 304.
 — combinations, 304.
 — compounds, 304.
 Silkweed, 131.
 Silphium, 223.
 Silver, 451.
 — (element), 305.
 — albumin, 455.
 — casein, 455.
 — colloidal, 455.
 — combinations, 305.
 — compounds, 305.
 — cyanide, 452.
 — German, 271.
 — methods of
 separating, 305.
 — nickel, 271.
 — nitrate, 452.
 — — fused, 453.
 — — mitigated, 453.
 — — moulded, 453.
 — nucleo proteid, 455.
 — oxide, 454.
 — plating, 305.
 — quinaesepolate, 455.
 — refined, 452.
 — vitellin, 455.
 Simple elixir, 541.
 — ointment, 1094.
 — syrup, 983.
 Simulo tincture, 1099.
 Simaruba, 223.
 — bark, 223.
 — fluidextract, 223.
 Sinapis, 223.
 — alba, 223.
 — nigra, 223.
 — — semina, 223.
 — albæ semina, 223.
 Skin food, peerless,
 1293.
 — ointment, 1228.
 Skunk bush, 171.
 — -cabbage, 161.
 — — fluidextract, 161.
 Slaked lime, 485.
 Slippery elm, 231.
 Sloe, 234.
 Smalt, 270.
 Smaltite, 269.
 Smaragdin, 408.
 Smartweed, 208.
 — compound, 1211.
 — fluidextract, 208.
 Smelling salts, 1311.
 Smilacin, 224.
 Smilax, 224.
 — sarsaparilla, 224.

- Snakehead, 147.
 Snakeroot, black, 149.
 — button, 164.
 — Canada, 131.
 — Virginia, 223.
 Snakeweed, 136, 166.
 Snuff beans, 229.
 — catarrh, 1166.
 Soap, 929.
 — bark, 211.
 — — fluidextract, 211, 702.
 — — tincture, 211.
 — compound, pill, 885.
 — dialysed, 536.
 — green, 929.
 — hard, 929.
 — liniment, 770.
 — mottled castile, 929.
 — plaster, 633.
 — soft, 929.
 — tincture, 1077.
 — white castile, 929.
 Soaps, 926.
 — hard, general formula, 927.
 — liquid, 1313.
 — soft, general formula, 927.
 — toilet, 1312.
 Soapwort, 218.
 — fluidextract, 218.
 Socotrine aloes, 416.
 Soda, 939.
 — ash, 412.
 — caustic, 939.
 — foam, 1332.
 — hypophosphite syrup, 1010.
 — ice cream, 1341.
 — mint, 1259.
 — tartarata, 898, 933.
 — tartarated, 898, 933.
 — water requisites, 1328.
 — — syrup, 1329.
 — — syrups, 1333.
 Sodii acetat, 933
 — arsenas, 933, 934.
 — — exsiccatus, 934.
 — benzoas, 934.
 — bicarbonas, 935.
 — bisulphis, 935.
 — boras, 935.
 — bromidum, 936.
 — carbonas, 936.
 — — exsiccatus, 937.
 — — monohydratus, 937.
 — chloras, 937.
 — chloridum, 938.
 Sodii citratis, 938.
 — citro-tartras effervescens, 939.
 — hydroxidum, 939.
 — hypophosphis, 939.
 — hyposulphis, 945.
 — iodidum, 940.
 — nitras, 940.
 — nitris, 940.
 — phenolsulphonas, 941.
 — phosphas, 941.
 — — effervescens, 941.
 — — exsiccatus, 942.
 — pyrophosphas, 942.
 — salicylas, 943.
 — sulphas, 943.
 — — effervescens, 944.
 — sulphis, 944.
 — sulphocarbonas, 945.
 — thiosulphas, 945.
 — thiosulphis, 945.
 Sodium (element), 307.
 — acetate, 933.
 — arsenate, 933.
 — — exsiccated, 934.
 — arsenate solution, 795.
 — benzoate, 934.
 — biborate, 475, 935.
 — bicarbonate, 935.
 — — lozenge, 1093.
 — bisulphite, 935.
 — borate, 475, 935.
 — bromide, 936.
 — — elixir, 620.
 — — syrup, 1006.
 — carbonate, 936.
 — — dried, 937.
 — — exsiccated, 937.
 — — monohydrated, 937.
 — chlorate, 937.
 — chloride, 938.
 — citrate, 938.
 — citro-tartrate, effervescent, 939.
 — combinations, 307.
 — compounds, 307.
 — ethylate solution, 7895.
 — hydroxide, 939.
 — — solution, 795.
 — hypophosphite, 939.
 — — syrup, 1010.
 — hyposulphite, 945.
 — iodide, 940.
 — metallic, 307.
 — nitrate, 940.
 — nitrite, 940.
 — or Natrium, 932.
 — paracresolate, 529.
 Sodium paraphenol-sulphonate, 945.
 — phenolsulphonate, 941.
 — phosphate, 941.
 — — compound solution, 796.
 — — effervescent, 941.
 — — exsiccated, 942.
 — potassium tartrate, 933.
 — pyrophosphate, 942.
 — salicylate, 943.
 — — elixir, 620.
 — salts of, general, 307.
 — salts, other, 945.
 — silicate solution, 796.
 — sulphate, 943.
 — — effervescent, 944.
 — sulphite, 944.
 — sulphocarbonate, 945.
 — thiosulphate, 945.
 Soft corn remover, 1174.
 — soap, 929.
 — — liniment, 770.
 — solder, 258.
 Solidago, 224.
 — odora, 224.
 — virgaurea, 224.
 Solomon's seal, 208.
 — fluidextract, 208.
 Soluble blue, 280.
 — flavoring extracts, 1323.
 — ginger extract, 1326.
 — — ale extract, 1326.
 — lemon extract, 1326.
 — mead extract, 1327.
 — orange extract, 1327.
 — sarsaparilla ext., 1327.
 — wintergreen ext., 1327.
 Solutio ammoniæ spirituosâ anisata, 960.
 Solution, 105.
 — ammonia, 772.
 — ammonium acetate, 773.
 — — citrate, 773.
 — antiseptic, 773, 1146.
 — arsenical, 774.
 — arsenous acid, 772.
 — — and mercuric iodides, 775.
 — atropine sulphate, 775.
 — bismuth and ammonium citrate, 775, 946.
 — — conc., 947.
 — boric acid, 955.

Solution calcium

- hydroxide, 775.
- — lactophosphate, 947.
- — phosphate, 947.
- calumba conc., 777.
- carbolic acid, 948.
- carmine, 517.
- chiretta comp., 777.
- chlorinated lime, 776.
- — soda, 794.
- chlorine comp., 777.
- chlorophyl, 519.
- chromic acid, 772.
- citric acid, 948.
- coal tar, 789.
- cocaine, 954.
- corrosive sublimated, 785.
- cresol, 778.
- cusparia conc., 778.
- Dobell's, 1147.
- Donovan's, 775.
- ethyl nitrite, 779.
- ferric acetate, 779.
- — chloride, 779.
- — — strong, 782.
- — citrate, 780.
- — nitrate, 782.
- — sulphate, 782.
- — subsulphate, 783.
- formaldehyde, 720, 784.
- Fowler's, 774.
- gluside, 953.
- Goulard's, 790.
- gutta percha, 784.
- hamamelis, 785.
- hydrastis, colorless, 1250.
- hydrogen dioxide, 447.
- — peroxide, 447, 785.
- hypophosphites compound, 948.
- India rubber, 777.
- iodine comp., 786.
- — strong, 786.
- iron and ammonium acetate, 781.
- — — citrate, 949.
- — chloride, 949.
- — citro-chloride, 949.
- — hypophosphite, 950.
- — lactophosphate, 950.
- — pernitrate, 782.
- — persulphate, 783.
- — phosphate, 950.
- — pyrophosphate, 951.

Solution krameria,

- concentrated, 786.
- Labarraque's, 794.
- lactophosphates comp., 951.
- lead subacetate, 789.
- — — diluted, 790.
- — — strong, 790.
- lime, 444, 775.
- — chlorinated, 776.
- — lactophosphates, 947.
- — phosphate, 947.
- — saccharated, 776.
- Lugol's, 786.
- magnesium carbonate, 787.
- — citrate, 787.
- manganese hypophosphite, 951.
- — lactophosphate, 951.
- — phosphate, 951.
- mercuric chloride, 785.
- — nitrate, 785.
- — — acid, 785.
- morphine acetate, 788.
- — hydrochloride, 788.
- — tartrate, 788.
- nitroglycerin, 797.
- pancreatic, 789.
- phosphates compound, 952.
- — conc., 952.
- potash, 791.
- potassium arsenite, 791.
- — citrate, 791, 952.
- — hydroxide, 792.
- — permanganate, 792.
- protoxide of iron, 953.
- rhubarb, conc., 792.
- quassia, conc., 792.
- saccharated lime, 776.
- saccharum, 953.
- sarsaparilla comp., concentrated, 793.
- senna, conc., 793.
- serpentary, conc., 794.
- sodium arsenate, 795.
- — ethylate, 795.
- — hydroxide, 795.
- — phosphate, 796.
- — silicate, 796.
- strychnine hydrochloride, 796.
- — sulphate, 953.
- thyroid, 796.
- trinitrin, 797.

Solution zinc

- chloride, 797.
- Solutions, 946.
- disinfecting, 1383.
- essential oils, 1310.
- homœopathic, 1134.
- hypodermic, 904.
- percentage, 954.
- saturated, 105, 955.
- supersaturated, 105.
- synthetic bodies, 1303.
- Solutol, 529, 956.
- Solveol, 529, 956.
- Somatose, 956.
- Somnal, 502.
- Somnoform, 956.
- Soot oil, 727.
- Soothing and Teething Syrups, 1238.
- Soothing syrup, 1239.
- Sorbit, 923.
- Sorrel tree, 201.
- — fluidextract, 202.
- Southernwood, 130.
- fluidextract, 130.
- Sozodont, 1273.
- Sodoiodol, 378.
- Sozolic acid, 379.
- Spa water solution, 1347.
- Spanish needles, 136.
- — fluidextract, 136.
- Sparadraps, 628.
- Sparkman's cholera mixture, 1172.
- Sparteinae sulphas, 946.
- Sparteine, 221.
- sulphate, 221, 946.
- Spavin cure, 1214.
- Spearmint, 195.
- essence, 965, 1318.
- oil, 195, 840.
- spirit, 966.
- water, 450.
- Species—Teas, 956.
- amara, 956.
- aromaticæ, 956.
- carminative, 957.
- diuretica, 957.
- emollientes, 957.
- laxantes, 957.
- lignorum, 957.
- pectorales, 957.
- Specific heat, 80.
- hospital, 1240.
- Rex magnus, 1241.
- weight or gravity, 69.
- — early history, 69.
- Specifics, 1240.
- Speedwell, 233.
- Spelter, 323.

- Sperm oil, 829.
 Spermaceti, 147.
 — ointment, 1099.
 — saccharated, 147.
 Spice-bush bark, 189.
 — — berries, 189.
 Spigelia, 224.
 — fluidextract, 224, 707.
 Spigeline, 225.
 Spike oil, 846.
 Spikenard, 129.
 — fluidextract, 129.
 Spindle tree, 165.
 Spiny burr-weed, 235.
 — — fluidextract, 235.
 Spirit ammonia, 957.
 — — fetid, 961.
 — — aromatic, 960.
 — — anisated, 960.
 — angelica comp., 967.
 — anise, 962.
 — balm, comp., 967.
 — bitter almond, 962.
 — bone, 491.
 — bryony comp., 967.
 — cajuput, 963.
 — camphor, 963.
 — chloric ether, 963.
 — chloroform, 963.
 — cinnamon, 964.
 — cochlearia, 967.
 — cologne, 408.
 — ether, 957.
 — — compound, 958.
 — floravanti, 967.
 — formic acid, 968.
 — French cologne, 409.
 — gaultheria, 964.
 — glyceryl trinitrate, 964.
 — gum, 1283.
 — honey comp., 968.
 — horseradish comp., 962.
 — juniper, 965.
 — — comp., 965.
 — lavender, 965.
 — — compound, 1065.
 — mastic comp., 968.
 — methylated, 401.
 — mustard, 968.
 — myrcia, 966.
 — nitroglycerin, 964.
 — nitrous ether, 958.
 — nutmeg, 966.
 — of nitre, sweet, 958.
 — orange comp., 538, 962.
 — peppermint, 965.
 — proof, 403.
 — pyroacetic, 330, 968.
 Spirit pyroxylic, 968.
 — rectified, 403, 966.
 — rosemary, 967.
 — spearmint, 966.
 — vulnerary, 968.
 — wood, 968.
 Spirits, 403.
 — of wine, 403.
 — proof of, 402.
 — pure, neutral, 403.
 Spiriti—Spirits, 957.
 Spiritous Liquors, 1355.
 Spiritus ætheris, 957.
 — — comp., 959.
 — — nitrosi, 958.
 — — ammoniæ, 959.
 — — anisatus, 959, 960.
 — — aromaticus, 959.
 — — foetidus, 961.
 — amygdalæ amaræ, 962.
 — anisi, 962.
 — armoraciæ — — comp., 962.
 — aurantii comp., 962.
 — camphoræ, 963.
 — chloroformi, 963.
 — cinnamomi, 964.
 — cajuputi, 963.
 — frumenti, 964.
 — gaultheriæ, 964.
 — glononi, 964.
 — glycerylis nitratis, 964.
 — juniperi, 965.
 — — comp., 965.
 — lavendulæ, 965.
 — menthæ piperitæ, 965.
 — — viridis, 966.
 — myristicæ, 966.
 — rectificatus, 403, 966.
 — rosmarini, 967.
 — tenuior, 409.
 — vini gallaci, 967.
 — weingeist, 403.
 Spleen mixture, Gadberry's, 1217.
 Sponge, 225.
 Spongia, 225.
 Sponges, cup, 225.
 — sheep's wool, 225.
 Spoonwood, 185.
 — fluidextract, 185.
 Squaw root, 145.
 — vine, 196.
 — — vine comp. syrup, 1022.
 Squibb's cholera mixture, 1172.
 — diarrhœa mixture, 1217.
 Squill, 220.
 — comp. elixir, 619.
 — — pill, 885.
 — fluidextract, 220, 705.
 — oxymel, 856.
 — syrup, 1000.
 — — comp., 1000.
 — tincture, 220, 1077.
 — vinegar, 220, 341.
 Squirrel corn, 156.
 Squirting cucumber, 162.
 Spruce, 114.
 — beer, 115.
 — beer extract, 1325.
 — black, 115.
 — double, 115.
 — essences, 115.
 — fir, 115.
 — gum, 115.
 — — expectorant, 1182.
 — hemlock, 115.
 — Menzies, 115.
 — Norway, 115.
 — oil, 115.
 — white, 115.
 S. S. Specific, 1240.
 Stafftree, climbing, 145.
 Stagbush, 234.
 Stamping inks, 1391.
 Standard colognes, 1308.
 — remedies, 1137.
 — worm syrup, 1253.
 Stannic chloride, 318.
 — acid, 318.
 — iodide, 319.
 — oxide, 319.
 — sulphide, 319.
 Starwort, 178.
 Statice, 225.
 Stavesacre seeds, 225.
 — — fluidextract, 225, 707.
 — ointment, 1107.
 Steam, 322.
 Stearates, 379.
 Stearic acid, 379.
 Stearin, 379, 391.
 Stearopten, 331.
 Steel, 278.
 — crucible, 278.
 Spoonwoodis perfume, 1299.
 Stereotype-metal, 253.
 Stibium, 252, 430.
 Stibnite, 252.
 Stick cosmetic base, 1283.
 Stannous chloride, 318.
 — oxide, 319.
 — sulphide, 319.

- Stannum, 317.
 — granulatum, 318.
 — pulveratum, 318.
 — raspatum, 318.
 Staphisagria, 225.
 — fluidextract, 707.
 — semina, 225.
 Starch, 125,
 — glycerin, 729.
 — iodide syrup, 1012.
 — syrup, 534.
 Star-anise, 182.
 — — fruit, 182.
 Stargrass, 122.
 Sticta pulmonaris, 225.
 Sticky fly paper, 1385.
 St. Ignatius bean, 181.
 — — fluidextract, 181.
 Still, 91.
 — Fenner's, 92.
 Stillingia, 225.
 — comp. syrup, 1023.
 — elixir, 620.
 — fluidextract, 225, 707.
 Stillingine, 225, 226.
 St. Jacob's oil, 1224.
 St. John's wort, 181.
 — — fluidext., 181.
 Stoke's liniment, 1214.
 Stomach bitters,
 1156, 1367.
 — — extract, 1367.
 Stone crop, Virginia,
 203.
 — — fluidextract, 203.
 — oil, 846.
 — root, 152.
 Storax, 134.
 — prepared, 134.
 Storecin, 134.
 Stoughton bitters
 extract, 1367.
 Stoughton's elixir, 627.
 Stovaine, 968.
 Stramonii folia,
 226, 968.
 — semina, 226.
 Stramonium, 226, 968.
 — compound ointment, 1111.
 — extract, 664.
 — fluidextract, 226, 708.
 — leaves, 226, 968.
 — ointment, 1107.
 — seeds, 226.
 — tincture, 1097.
 Strasburg turpen-
 tine, 115, 852.
 Strawberry phos-
 phate, 1339.
 — syrup, 1339.
 Strengthening cordial,
 McLean's, 1240.
 Stick pomades, 1283.
 Strong solution of
 ammonia, 773.
 Stronger ammonia
 water, 442, 473.
 — lime water, 636.
 — orange flower
 water, 444.
 Strophanthin, 226, 970.
 Strophanthinum, 970.
 Strophanthus, 226.
 — extract, 664.
 — tincture, 226, 1080.
 Strontii bromidum, 969.
 — iodidum, 969.
 — salicylas, 969.
 Strontium, 969.
 — (element), 312.
 — combinations, 312.
 — bromide, 969.
 — iodide, 969.
 — salicylate, 969.
 — — comp. elixir, 621.
 — salts, elixirs, 621.
 — — other, 969.
 — salts of, general, 312.
 Strychnina, 970.
 Strychninae hydrochlor-
 idum, 971.
 — nitras, 971.
 — sulphas, 972.
 Strychnine, 199, 970.
 — arsenate, 972.
 — bromide syrup, 1006.
 — bromides comp., 1007.
 — cacodylate, 972.
 — elixir, 621.
 — glycerinophos-
 phate, 972.
 — hydrochloride, 971.
 — — solution, 976.
 — nitrate, 971.
 — oleate, 849.
 — salts, other, 972.
 — sulphate, 972.
 — — solution, 953.
 — valerate, elixir, 621.
 Stylosanthes, 226.
 — fluidextract, 226.
 Stypticin, 526.
 Styptol, 626.
 Styracin, 134.
 Styracol, 134.
 Styrax, 134, 972.
 — præparatis, 134.
 — benzoïn, 134.
 Styrol, 134.
 Subcutin, 429.
 Sublimate, 94.
 Sublimation, 94.
 Sublimed sulphur, 314.
 Succ—juices, 573.
 Succinates, 380.
 Succinic acid, 379.
 — peroxide, 417.
 Succus alterans, 1141.
 — belladonnæ, 973.
 — conii, 973.
 — hyoscyami, 973.
 — limonis, 973.
 — scoparii, 973.
 — taraxaci, 973.
 Suet, beef, 223.
 — mutton, 223.
 — prepared, 223, 932.
 — veal, 223.
 Suffixes and Termi-
 nations, 29.
 Sugar, 216, 922.
 — -cane, 922.
 — grape, 724.
 — of lead, 889.
 — of milk, 765, 923.
 — refined, 922.
 Sugars, non-fer-
 mentable, 923.
 Sucrose, 922.
 Sulphates, 315, 381.
 Sulphides, 344, 978.
 Sulphites, 384.
 Sulphonal, 974.
 Sulphonethyl-
 methane, 974.
 Sulphonethylmeth-
 anum, 974.
 Sulphur, 975.
 — (element), 313.
 — acids of, 314, 978.
 — amorphous, 977.
 — black, 978.
 — combinations, 313.
 — confection, 523.
 — etherate, 399.
 — flowers of, 976.
 — forms of, 314.
 — fuscum, 977.
 — hepar, 978.
 — iodide, 977.
 — — ointment, 1108.
 — iodidum, 977.
 — lac, 976.
 — liver of, 893.
 — lotum, 975.
 — lozenge, 1093.
 — milk of, 976.
 — ointment, 1108.
 — præcipitatum, 976.
 — precipitated, 976.
 — roll, 977.
 — salts of, 314, 978.

- Sulphur sublimatum, 976.
 — sublimed, 976.
 — vivum, 978.
 — washed, 975.
 Sulphurated oils, 831.
 Sulphuric acid, 381.
 — — diluted, 382.
 — — crude, 381.
 — — aromatic, 381.
 — — Nordhausen, 381.
 Sulphurets, 314, 978.
 Sulphuretted hydrogen, 314.
 Sulphurous acid, 383.
 Sumach, 213.
 — Chinese, 121.
 — fluidextract, 213, 703.
 Sumbul, 226.
 — compound elixir, 622.
 — elixir, 622.
 — extract, 665.
 — radix, 226.
 — root, 226.
 — tincture, 1081.
 Summer savory, 220.
 — — fluidextract, 220.
 Sundew, 161.
 — fluidextract, 161.
 Sunflower, 178.
 — seeds, 178.
 — — oil, 178.
 Suppositoria—
 Suppositories, 978.
 Suppositoria acidi
 carbolici, 980.
 — — tannici, 981.
 — belladonnæ, 981.
 — cacao, 981.
 — glycerini, 981.
 — iodoformi, 982.
 — morphinæ, 982.
 — plumbi comp., 982.
 Suppositories,
 general formula, 979.
 — belladonna, 981.
 — glycerin, 981.
 — iodoform, 982.
 — lead comp., 982.
 — morphine, 982.
 — phenol, 980.
 — rectal, 979.
 — tannic acid, 981.
 — urethral, 979.
 — vaginal, 979.
 Suppository, aloes, 981.
 — machines, 979.
 — rhatania, 982.
 Suprarenal gland, 120.
 — — dried, 172.
 Suprarenaline, 173, 393.
 Suprarenin, 393.
 Surgeon's agaric, 121.
 Sweet cicily, 201.
 — — fluidextract, 201.
 — clover, 194.
 — flag fluidext., 688.
 — — essence, 1316.
 — gum, 134, 190.
 — marjoram, 192.
 — orange peel, 132.
 — quinine, 915.
 — spirit of nitre, 958.
 Swietenia, 227.
 — fluidextract, 227.
 Succinum, 226.
 Sycocarpus Rusbyi, 227.
 Sylvia's hypnotic, 1145.
 Sympathetic inks,
 cobalt, 269.
 Symphyti radix, 227.
 Symphytum, 227.
 Synthetic bodies,
 solutions, 1304.
 — odors, flowers, 1304.
 — perfumes, 1300, 1306.
 — perfumes, bases, 1303.
 — sachets, 1311.
 Syrup, 983.
 — acacia, 985.
 — adiantum, 1019.
 — ague, 1139.
 — almonds, 986.
 — alterative, 1020.
 — alterative comp., 1141.
 — ammonium
 chloride, 1015.
 — aralia comp., 1020.
 — aromatic, 986.
 — artemisia comp., 1020.
 — asarum comp., 1020.
 — balsam of tolu, 1003.
 — blackberry
 comp., 1020.
 — blood and liver, 1141.
 — bromide iron,
 (tasteless), 1005.
 — — morphine, 1005.
 — — quinine, 1006.
 — — — and mor-
 phine, 1001.
 — — — and
 strychnine, 1005.
 — — sodium, 1006.
 — — strychnine, 1006.
 — — — and mor-
 phine, 1006.
 — — — iron and
 quinine, 1007.
 — calcium hydroxide,
 987.
 — — lactophos-
 phate, 987.
 Syrup capillaire, 1019.
 — carrageen comp.,
 1021.
 — cascara, aro-
 matic, 988.
 — ceanothus
 compound, 1021.
 — chloral, 988.
 — chloride of iron, 1007.
 — citrate iron, quinine
 and strychn., 1008.
 — of iron, 1008.
 — — — and quinine,
 1008.
 — — — and
 strychnine, 1000.
 — citric acid, 985.
 — codeine, 989, 1015.
 — corydalis comp., 1021.
 — dextrine, 534.
 — dialysed iron, 1008.
 — Dover's, 1022.
 — ferrous iodide, 989.
 — — phosphate, 990.
 — flavored, 1005.
 — ginger, 1004.
 — glycerinophos-
 phates comp., 1007.
 — glycyrrhiza
 comp., 1021.
 — golden, 1030.
 — glucose, 991.
 — hemidesmus, 991.
 — heroin comp., 1007.
 — hive, 1000.
 — hoarhound
 comp., 1022.
 — hydriodic acid, 985.
 — hypophosphite
 calcium, 1008.
 — — lime, 1008.
 — hypophosphites, 992.
 — — calcium com-
 binations, 1009.
 — — compound,
 992, 1008, 1011.
 — — — Churchill's, 992.
 — — iron com-
 binations, 1009.
 — — with quinine and
 strychnine, 1011.
 — Iceland moss
 comp., 1021.
 — Indian sarsa-
 parilla, 991.
 — iodide comb., 1012.
 — — of calcium, 1011.
 — — of iron,
 (tasteless), 1011.
 — ipecac, 993.
 — iron oxide, 990.

Syrup iron oxide and sodium albuminate, 1012.
 — krameria, 994.
 — lactated pepsin, 1013.
 — lactophosphate combinations, 1013, 1014.
 — lactucarium, 994.
 — lemon, 995.
 — licorice comp., 1021.
 — lime, 987.
 — maiden-hair fern, 1019.
 — manganese combinations, 1010, 1016.
 — marrubium comp., 1022.
 — mitchella comp., 1022.
 — morphine, 1014.
 — mugwort comp., 1020.
 — muriate ammonium, 1015.
 — nascent phenic acid, 1015.
 — neutralizing, 1022.
 — of Virginia prune, 996.
 — opium and ipecac, 1022.
 — orange, 986.
 — orange flowers, 987.
 — partridgeberry comp., 1022.
 — pepsin, 1015.
 — phosphates combinations, 1015, 1017.
 — — comp., 1017.
 — phytolacca comp., 1022.
 — phosphate of iron, quinine and strychnine, 990, 991.
 — poke root comp., 1022.
 — pyrophosphate iron, 1018.
 — queen's root comp., 1023.
 — quinine comb., 1016.
 — — tasteless, 1018.
 — raspberry, 998.
 — red clover comp., 1237.
 — red poppy, 998.
 — red root comp., 1021.
 — rhubarb, 997.
 — — aromatic, 997.
 — — and potassium, 1022.

Syrup rose, 998.
 — roses, 998.
 — rubus, 998.
 — rumex comp., 1023.
 — sarsaparilla comp., 999.
 — senega, 1001.
 — senna, 1002.
 — simple, 983.
 — soda water, 1329.
 — squaw vine comp., 1022.
 — squill, 1000.
 — — comp., 1000.
 — starch, 534.
 — stillingia comp., 1023.
 — tar, 995.
 — terpin hydrate with codeine, 1019.
 — terebene aromatic, 1019.
 — tolu, 1003.
 — turkey corn comp., 1021.
 — Weld's, 1007.
 — wild cherry, 996.
 — — and tar, 1178.
 — worm, standard, 1253.
 — yellow dock comp., 1023.
 — yerba santa comp., 1023.
 Syrupi—Syrups, 983.
 Syrups, chemical substances, 1004.
 — cough, 1177.
 — fruit, concentrated, 1331.
 — fruit juice, 1333.
 — soothing, 1239.
 — unofficial, 1004.
 — vegetable substances, 1019.
 Syrupus, 983.
 — acaciæ, 985.
 — acidi citrici, 985.
 — — hydriodici, 985.
 — amygdalæ, 986.
 — aromaticus, 986.
 — aurantii, 986.
 — — floris, 987.
 — — florum, 987.
 — calcii lactophosphatis, 987.
 — calcis, 987.
 — cascaræ aromaticus, 988.
 — chloral, 988.
 — codeinæ, 989.
 — ferri iodidi, 989.
 — — oxydati, 990.

Syrupus ferri phosphatis, 990.
 — — quiniæ et strychninæ phosph., 990.
 — ferri phosphatis cum quiniæ et strychnina, 990.
 — glucosi, 991.
 — hemidesmi, 991.
 — hypophosphitum, 992.
 — — comp., 992, 1009.
 — ipecacuanhæ, 993.
 — krameriæ, 994.
 — lactucarii, 994.
 — limonis, 995.
 — picis liquidæ, 995.
 — pruni Virginianæ, 996.
 — rhei, 997.
 — — aromaticus, 997.
 — rhæados, 998.
 — rosæ, 998.
 — rubi, 998.
 — — idæi, 998.
 — sarsaparillæ comp., 1000.
 — scillæ, 1000.
 — — comp., 1000.
 — senegæ, 1001.
 — sennæ, 1002.
 — toltanus, 1003.
 — zingiberis, 1004.
 System, periodic, 241.
 Systems of crystallization, 84.

T

Tabellæ—Tablets, 1024.
 Tabellæ trinitrini, 1025.
 Tablet triturates, 1025.
 Tablets, compressed, 1024.
 — coated, 1024.
 — diarrhœa, 1185.
 — dyspepsia, 1187.
 — effervescent, 1025.
 — fruit, 1025.
 — hypodermic, 1025.
 — nitroglycerin, 1025.
 — uterine, 1251.
 Tacamahaca, 133.
 Taffy, 1352.
 — cream, 1352.
 Talc, 1025.
 — purified, 1026.
 Talcum, 1025.
 — purificatum, 1026.
 — toilet powder, 1271.
 Tallow, bayberry, 146.
 Tamar-Indien, 1169.
 Tamarack, 188.

- Tamarack fluid-extract, 188.
 — gum, 188.
 Tamarind, 227, 1026.
 Tamarindico, 227, 1026.
 Tamacetin, 227.
 Tangerine syrup, 1339.
 Tannal, 1026.
 Tannalbin, 1027.
 Tannates, 385.
 Tannic acid, 384.
 — — glycerin, 729.
 — — glycerite, 729.
 — — ointment, 1075.
 — — troches, 1089.
 Tannigen, 342, 1027.
 Tannin, 384.
 — albuminate, exsiccated, 1027.
 — compounds, 1026.
 — formaldehyde, 1027.
 Tannipine, 1027.
 Tannipyrin, 435.
 Tannismuth, 258, 1027.
 Tannocol, 1027.
 Tannoform, 720, 1027.
 Tannosal, 528.
 Tansy, 227.
 — oil, 227.
 — tea, 227.
 Tantalum (element), 315.
 — combinations, 316.
 Tape worm expeller, 1255.
 — — remedy, 1256.
 Taphosote, 528.
 Tar, 887.
 — Barbados, 846.
 — birch, 887.
 — coal, 888.
 — — prepared, 888.
 — compound glycerite, 733.
 — glycerite, 732.
 — oil, 841.
 — ointment, 1105.
 — pine, 887.
 — prepared, coal, 887.
 — Stockholm, 887.
 — syrup, 995.
 — wine, 1126.
 Taracanin, 137.
 Taraxaci radix, 227.
 Taraxacum, 227.
 — comp. elixir, 579, 662.
 — elixir, 579.
 — fluidextract, 227, 665.
 — juice, 993.
 — liquid extract, 708.
 — root, 227.
 Tarragon, 130.
 — vinegar, 130.
 Tartar, cream of, 895.
 — — purified, 903.
 — emetic, 431.
 — — elixir, 549.
 — — ointment, 1108.
 — sal, 895.
 Tartarated antimony, 431.
 — iron, 670.
 — soda, 898, 933.
 — soda powder, effervescent, 909.
 Tartaric acid, 385.
 Tartrates, 386.
 — acid, 387.
 — normal, 387.
 Tartrophen, 866.
 Tea, 228.
 — fluidextract, 228.
 — bitter, 956.
 — blood purifying, 1162.
 — carminative, 957.
 — diuretic, 957.
 — Hamburg, 1230, 1182.
 — Jersey, 154.
 — kidney and liverwort, 1207.
 — Labrador, 188.
 — marsh, 188.
 — laxative, 957, 1170.
 — Paraguay, 182.
 — pectoral, 957, 1182, 1230.
 — rheumatic, 1233.
 — syrup, 1339.
 — teamster's, 163.
 — vermifuge, 1255.
 — whorehouse, 163.
 — wood, 957.
 Teamster's tea, 163.
 Telluric acid, 316.
 Telluride hydride, 316.
 Tellurides, 316.
 Tellurium (element), 316.
 — acids of, 316.
 — combinations, 316.
 — compounds, 316.
 — dioxide, 316.
 Tellurous acid, 316.
 Temperature, defined, 77.
 Tender feet, tablets, 1196.
 Terbium (element), 316.
 — combinations, 316.
 Terebene, 844, 1027.
 — cough mixture, 1181.
 Terebene syrup, aromatic, 1019.
 Terebenum, 1027.
 Terebinthina, 228, 851, 1028.
 — Canadianis, 115, 228, 851, 1028.
 Terms, Medicinal, Pharmaceutical and Chemical, 31.
 Terpentinsalbe, 1108.
 Terpin cough compound, 1181.
 — hydrate, 1028.
 — — and cocaine elixir, 623.
 — — elixir, 622.
 — — comp. elixir, 623.
 — — with codeine syrup, 1019.
 Terpene, 1028.
 Terpeneol, 1301.
 Terpenes, 831.
 Terpini hydras, 1028.
 Testa ovi, 201.
 Testa, shells, 113.
 Tetanus antitoxin, 932.
 Tetra-iodo-phenol-phtaleate of soda, 435.
 Tetra-iodo-phenol-phtalein, 1029.
 Tetra-iodo-pyrrol, 758.
 Tetter ointment, 1228.
 Thallin, 1029.
 Thalline, 1029.
 — sulphate, 1029.
 — tartrate, 1029.
 Thallium (element), 316.
 — combinations, 317.
 — compounds, 317.
 — salts of, 317.
 Thallinum, 1029.
 Thapsia, 228.
 — fluidextract, 228.
 Thea, 228.
 Theæ folia, 228.
 Theatre cold cream, 1270.
 — face powder, 1271.
 Thebaine, 854.
 Theine, 481.
 Theobroma, 228.
 — oil, 828.
 Theobromine, 229, 1030.
 — and lithium benzoate, 1030.
 — — salicylate, 1030.
 — and sodium salicylate, 1030.
 — sodium, 1030.

- Theobrominum, 1030.
 Theolactin, 1030.
 The periodic system, 241.
 Thepuorin, 1030.
 Theiia, 1030.
 — Andromachi, 1030.
 Theriaque electuaire, 1030.
 Thermit, 247.
 Thermodine, 342.
 Thermol, 342.
 Thermometers, 78.
 — Fahrenheit scale, 77.
 — Celsius scale, 78.
 — Centigrade scale, 78.
 — Réaumur scale, 78.
 Thermometers, clinical, 78.
 — chemical, 78.
 Thermometric equivalents, 79.
 Thermometry, 77.
 — early history, 77.
 Thibault's balsam, 1154.
 Thielmann's cholera drops, 1172.
 Thimble-weed, 215.
 — — fluidextract, 215.
 Thiocol, 1030.
 Thiodine, 1032.
 Thioform, 259.
 Thiol, 1031.
 — collodion, 1031.
 — dusting powder, 1031.
 — glycerite, 1031.
 — liquid, 1031.
 — salve, 1031.
 — solution, 1031.
 — wine, 1031.
 Thiolum, 1031.
 Thionic series, 387.
 Thiosinamin, 129.
 Thiosinamine, 415, 1031.
 Thiosulphuric acid, 387.
 Thistle, blessed, 145.
 Thoria, 317.
 Thorium (element), 317.
 — combinations, 317.
 — compounds, 317.
 — oxide, 317.
 — nitrate, 317.
 — salts of, 317.
 — used for gas mantles, 317.
 Thornapple, 968.
 Three iodides elixir, 592.
 Thria, 229.
 — fluidextract, 229.
 Thuja tincture, 229.
 Thulium (element), 317.
 — combinations, 317.
 Thus Americanum, 228, 1028.
 Thymacetin, 1032.
 Thyme, 229.
 — fluidextract, 229.
 — oil, 229, 844.
 Thymene, 229, 844.
 Thymi folia, 229.
 Thymol, 229, 845, 1032.
 — -chloral liniment, 1211.
 — iodide, 1032.
 — ointment, 1228.
 — salicylate, 1032.
 — tooth-ache remedy, 1248.
 Thymolis iodidum, 1032.
 Thymus, 229.
 Thyroid, dry, 1032.
 — glands, desiccated, 1032.
 — — dried, 1032.
 — solution, 796.
 Thyroideum siccum, 173, 1032.
 Thyroidin, 173, 760.
 Thyroglandulin, 173.
 Tilia, 229.
 Tiliæ flores, 229.
 Tin (element), 317.
 — alloys of, 318.
 — combinations, 318.
 — compounds, 318.
 — flossed, 318.
 — foil, 318.
 — grain, 318.
 — granulated, 318.
 — hydrated oxide, 318.
 — hydrates, 318.
 — iodides, 319.
 — mordants, 319.
 — oxides, 319.
 — protiodide, 319.
 — rasped, 318.
 — salts of (chloride), 318.
 — salts, general, 318.
 — spirits of, 318.
 — sulphides, 319.
 Tinctura absinthii, 1033.
 — — composita, 1034.
 — aconiti, 1034.
 — adonis æstivalis, 1223.
 — — vernalis, 1035.
 — aloes, 1035.
 — — crocata, 1036.
 — — et myrrhæ, 1036.
 Tinctura amara, 1036.
 — — arnica, 1036, 1037.
 — — radices, 1037.
 — aromatica, 1037.
 — asafetida, 1037.
 — aurantii amari, 1038.
 — — composita, 1038.
 — — dulcis, 1038.
 — balsamica, 1039.
 — belladonnæ, 1039.
 — — foliorum, 1039.
 — benzoini, 1040.
 — — composita, 1040.
 — buchii, 1041.
 — calami, 1041.
 — calendulæ, 1041.
 — camphoræ composita, 1042.
 — calumbæ, 1042.
 — cannabis indicæ, 1043.
 — cantharidis, 1043.
 — capsici, 1044.
 — cardamomi, 1045.
 — — composita, 1045.
 — carminativa, 1046.
 — cascarillæ, 1046.
 — catechu, 1046.
 — castorei, 1046.
 — chirate, 1046.
 — chloroformi composita, 1046.
 — — et morphinæ composita, 1047.
 — cimicifugæ, 1047.
 — cinchonæ, 1048.
 — — composita, 1049.
 — cinnamomi, 1050.
 — cocci, 1051.
 — colchici seminis, 1051.
 — — seminum, 1052.
 — conii, 1052.
 — convallariæ, 1052.
 — coto, 1052.
 — croci, 1052.
 — cubebæ, 1053.
 — digitalis, 1053.
 — ergotæ ammoniata, 1053.
 — euonymi, 1054.
 — euphorbiæ piluliferæ, 1054.
 — ferri acetici ætherea, 1054.
 — — chloridi, 1054.
 — — perchloridi, 1055.
 — gallæ, 1055.
 — gambir, comp., 1055.
 — gelsemii, 1056.
 — guaiaci, 1057.
 — — ammoniata, 1058.

- Tinctura hamamelidis*, 1058.
 — *hydrastis*, 1059.
 — *hyoscyami*, 1060.
 — *iodi*, 1060.
 — — *decolorata*, 1061.
 — *ipēcacuanhæ*, 1061.
 — — *et opii*, 1061.
 — *jaborandi*, 1062.
 — *jalapæ*, 1062.
 — *kino*, 1062.
 — *kolæ*, 1063.
 — *krameria*, 1063.
 — *lactucarii*, 1064.
 — *lavendulæ*
 composita, 1065.
 — *limonis corticis*, 1065.
 — *lobeliæ*, 1066.
 — — *ætherea*, 1066.
 — *lupuli*, 1066.
 — *moschi*, 1067.
 — *myrrhæ*, 1067.
 — *nucis vomicæ*, 1067.
 — *opii*, 1068.
 — — *ammoniata*, 1069.
 — — *camphorata*, 1069.
 — — *deodorati*, 1070.
 — *phosphori*
 compositus, 1071.
 — *physostigmatis*, 1071.
 — *podophylli*, 1072.
 — *pruni Virginianæ*, 1072.
 — *pulsatillæ*, 1072.
 — *pyrethri*, 1072.
 — *quassia*, 1073.
 — *quebracho*, 1073.
 — *quillajæ*, 1074.
 — *quininæ*, 1074.
 — — *ammoniata*, 1074.
 — *rhatanizæ*, 1074.
 — *rhei*, 1075.
 — — *aromatica*, 1075.
 — — *composita*, 1076.
 — *sanguinarizæ*, 1076.
 — *saponis*, 1077.
 — *scillæ*, 1077.
 — *senegæ*, 1077.
 — *sennæ comp.*, 1078.
 — *serpentariæ*, 1078.
 — *simulo*, 1079.
 — *stramonii*, 1079.
 — *strophanthi*, 1080.
 — *strychni*, 1080.
 — — *Malaccensis*, 1080.
 — *sumbul*, 1081.
 — *tolutana*, 1081.
 — *valerianæ*, 1081.
 — — *ætherea*, 1082.
 — — *ammoniata*, 1082.
 — *vanillæ*, 1083.
- Tinctura veratri*, 1083.
 — — *viride*, 1083.
 — *yerba santa*
 aromatica
 solubilis, 1084.
 — *zingiberis*, 1084.
 — — *fortior*, 1085.
Tincturæ—Tinctures, 1033.
Tincturæ herbarium recentium, 1085.
Tincture or tincture of—, 1033.
Tincture acetate of iron, 1054.
 — — *Rademacher's*, 1054.
 — *aloes*, 1035.
 — *aconite*, 1034.
 — — *etherial*, 1035.
 — — *Fleming's*, 1035.
 — — *leaves*, 1035.
 — *actæa*, 1047.
 — *adhatoda*, 119.
 — *arnica flowers*, 1036.
 — — *root*, 1037.
 — *aromatic*, 1037.
 — *asafetida*, 1037.
 — *avena sativa*, 1258.
 — *balsamic*, 1039.
 — *belladonna*
 leaves, 1039.
 — — *root*, 1039.
 — *benzoin*, 1040.
 compound, 1040.
 — *bitter*, 1036.
 — — *orange peel*, 1038.
 — *black cohosh*, 1047.
 — *bloodroot*, 1076.
 — *buchu*, 1041.
 — *calabar bean*, 1071.
 — *calamus*, 1041.
 — *calendula*, 1041.
 — *calumba*, 1042.
 — *camphor comp.*, 1042.
 — *cantharides*, 1043.
 — *capparis*
 coriacea, 1079.
 — *capsicum*, 1044.
 — *cardamom*, 1045.
 — — *compound*, 1045.
 — *carminative*, 1046.
 — *cascarilla*, 1046.
 — *castor*, 1046.
 — *catechu*, 1046.
 — — *compound*, 1055.
 — — *for wine*, 1364.
 — *chiretta*, 1046.
 — *chloroform and morphine*, 1047.
 — — *compound*, 1046.
- Tincture cimicifuga*, 1047.
 — *cinchona*, 1048.
 — — *compound*, 1049.
 — *cinnamon*, 1050.
 — *colchicum seed*, 1051, 1052.
 — *cochineal*, 1051.
 — *conium*, 1052.
 — *coto*, 1052.
 — *cubebs*, 1053.
 — *deodorized*
 opium, 1070.
 — *digitalis*, 1053.
 — *ergot, ammoniated*, 1053.
 — *euonymus*, 1054.
 — *euphorbium*, 1054.
 — *ferric chloride*, 1054.
 — *fresh herbs*, 1085.
 — *gambir, comp.*, 1055.
 — *gelsemium*, 1056.
 — *gentian comp.*, 1056.
 — — *improved*, 1057.
 — *ginger*, 1084.
 — — *stronger*, 1085.
 — *golden seal*, 1059.
 — *green soap*, 1077.
 — *guaiaic*, 1057.
 — — *alkaline*, 1058.
 — — *ammoniated*, 1058.
 — — *Dewee's*, 1058.
 — *hamamelis*, 1058.
 — *hemlock*, 1052.
 — *hoang nan*, 1080.
 — *hops*, 1066.
 — *Huxham's*, 1049.
 — *hydrastis*, 1059.
 — *hyoscyamus*, 1060.
 — *Indian cannabis*, 1043.
 — — *hemp*, 1043.
 — *iodine*, 1060.
 — — *decolorized*, 1061.
 — *ipēcac.*, 1061.
 — — *and opium*, 1061.
 — *jaborandi*, 1062.
 — *jalap*, 1062.
 — *kino*, 1062.
 — — *for wine*, 1365.
 — *kola*, 1063.
 — *krameria*, 1065, 1078.
 — *lactucarium*, 1064.
 — *lavender comp.*, 1065.
 — *lemon*, 1065.
 — *lily of the valley*, 1052.
 — *lobelia*, 1066.
 — — *etherial*, 1066.
 — *marigold*, 1041.
 — *muriate of iron*, 1054.
 — *musk*, 1067.
 — *myrrh*, 1067.

- Tincture nutgall, 1055.
 — nux vomica, 1067, 1080.
 — opium, 1068.
 — — ammoniated, 1069.
 — — camphorated, 1069.
 — opium comp., 1217.
 — orange comp., 1038.
 — — peel, sweet, 1038.
 — pellitory, 1072.
 — phosphorus compound, 1071.
 — physostigma, 1071.
 — pilocarpus, 1062.
 — podophyllum, 1071.
 — pulsatilla, 1072.
 — pyrethrum, 1072.
 — quassia, 1073.
 — quebracho, 1073.
 — quillaia, 1074.
 — quinine, 1074.
 — — ammoniated, 1074.
 — red gum, for wine, 1365.
 — rhatany, 1063, 1074.
 — rhubarb, 1075.
 — — aromatic, 1075.
 — — special, 1075.
 — saffron, 1052.
 — sanguinaria, 1076.
 — senega, 1077.
 — senna comp., 1078.
 — serpentaria, 1078.
 — serpentary, 1078.
 — soap, 1076.
 — squill, 1077.
 — stramonium, 1079.
 — strophanthus, 1080.
 — sumbul, 1081.
 — tolu, 1081.
 — valerian, 1081.
 — — ammoniated, 1082.
 — — etherial, 1082.
 — vanilla, 1083.
 — veratrum, 1083.
 — — viride, 1083.
 — — — Norwood's, 1084.
 — Virginian prune, 1072.
 — wild cherry, 1072.
 — witch hazel, 1058.
 — wormwood, 1033.
 — — compound, 1034.
 — yellow jasmine, 1056.
 — yerba santa, aromatic, 1084.
 Tinctures for perfumes, 1296.
 — homœopathic, 1133.
- Tinctures, process
 — maceration, 1033.
 — — percolation, 1033.
 — unofficial, 1086.
 Tinker's weed, 230.
 Tiol, 1031.
 Tisanes, 533, 1087.
 Titanic acid, 319.
 Titanium
 — (element), 319.
 — combinations, 319.
 — compounds, 319.
 — chloride, 319.
 — dioxide, 319.
 Tobacco, 198.
 — Indian, 190.
 Toilet preparations, 1265, 1294.
 — soaps, 1312.
 — vinegars, 1313.
 — waters, 1307, 1313.
 Tokay wine, 1365.
 — — essence, 1364.
 — syrup, 1339.
 Tolu, rock and rye, 1360.
 — — — red root, 1360.
 — syrup, 1003.
 Toluene, 510, 888.
 — or methylbenzene, 464.
 Toluol, 510.
 Tomato bouillon, 1344.
 Tombac, 271.
 Tonco seminæ, 229.
 — seeds, 229.
 Tonga, 230.
 — fluidextract, 230.
 Tonic, beef and coca, 1241.
 — celery, 1241.
 — cinkola, 1242.
 — damiana, 1147.
 — dyspepsia, 1186.
 — elixir, 627.
 — excelsior, 1242.
 — Freleigh's, 1243.
 — German, 1243.
 — hair, 1287.
 — iron, 1244.
 — katharion hair, 1287.
 — nervine, 1219.
 — Peruvian, 1245.
 — quinia Laroche, 1245.
 — roxa, 1246.
 — saka-to-wa, 1246.
 — system regulator, 1158.
 — vermifuge, 1253.
 Tonics and Restoratives, 1241.
- Tonka beans, 229.
 — — fluidextract, 230.
 — — essence or extract, 1320.
 Tonqua extract, 1297.
 Tonquin beans, 229.
 Tooth-ache
 — collodion, 1249.
 — — pellets, 1249.
 Tooth-ache Remedies, 1246, 1249.
 — — wax or gum, 1249.
 — — cream, Imperial, 1273.
 — — paste, charcoal, 1274.
 — — cherry, 1274.
 — — metal tubes, 1274.
 — pastes, 1274.
 — powder, antiseptic, 1275.
 — — camphorated, 1275.
 — — Imperial, 1275.
 — — rose, 1275.
 — — saponaceous, 1275.
 — powders, 1274.
 — tablets, 1275.
 — wash, Imperial, 1273.
 — washes and cosmetics, 1272.
 Tormentil, 230.
 — fluidextract, 230.
 Tormentilla, 230.
 Torrification, 94.
 Townsend's mixture, 1217.
 Tragacanth, 230.
 — comp. powder, 909.
 — glycerin, 731.
 — gum, 230.
 Tragacantha, 230.
 Trailing arbutus, 163.
 — fluidextract, 163.
 Tralles' alcoholometer, 72.
 Transparent cement, 1374.
 Treacle, 1030.
 Tree of Heaven, 121.
 Trehalose, 923.
 Triamines, 250.
 Tribromphenol, 477.
 Trichloracetic acid, 387.
 Trichlorisopropyl alcohol, 716.
 Tricresol, 528.
 Trifolium partense, 230.
 Tri-iodo methane, 757.
 Trillium, 230.
 Trillium, 230.
 Trinitrin solution, 797.

- Trinitrin tablets, 1025.
 Trinitro-cellulin, 912.
 Trinitrophenol, 376.
 Triosteum, 230.
 Triple extracts from
 pomades, 1295.
 Trithionic acid, 387.
 Triticum, 230.
 — fluidextract, 709.
 Trituration, 83.
 Trituratio
 elaterini, 1087.
 Trituration of
 elaterin, 1087.
 Triturations—
 Triturations, 1087.
 Triturations, general
 formula for, 1087.
 — homœopathic, 1135.
 Troches, ammonium
 chloride, 1090.
 — benzoic acid, 1089.
 — bismuth comp., 1090.
 — catechu, 1090.
 — cubebs, 1090.
 — eucalyptus gum, 1090.
 — gambir, 1091.
 — glycyrrhiza and
 opium, 1091.
 — guaiac resin, 1091.
 — ipecac, 1091.
 — krameria, 1091.
 — — and cocaine, 1092.
 — morphine, 1092.
 — — and ipecac, 1092.
 — phenol, 1089.
 — preparation of, 1088.
 — — with the fruit
 basis, 1088.
 — — with rose
 basis, 1089.
 — — with simple
 basis, 1089.
 — — with tolu
 basis, 1089.
 — potassium
 chlorate, 1092.
 — reduced iron, 1090.
 — santonin, 1092.
 — sodium bicar-
 bonate, 1093.
 — sulphur, 1092.
 — tannic acid, 1089.
 Trochisci—Troches,
 1088.
 Trochisci acidi
 tannici, 1089.
 — ammonii
 chloridi, 1090.
 — bismuthi comp., 1090.
 — catechu, 1090.
 Trochisci cubebæ, 1090.
 — eucalypti
 gummi, 1090.
 — ferri redacti, 1090.
 — gambir, 1091.
 — glycyrrhizæ
 et opii, 1091.
 — guaiaci resinæ, 1091.
 — ipecacuanhæ, 1091.
 — kramerizæ, 1091.
 — potassii chloratis,
 1092.
 — santonini, 1092.
 — sodii bicar-
 bonatis, 1093.
 Trochiscus acidi
 benzoici, 1089.
 — — carbolic, 1089.
 — — tannici, 1090.
 — bismuthi comp., 1090.
 — catechu, 1090.
 — eucalypti
 gummi, 1090.
 — ferri redacti, 1090.
 — guaiaci resinæ, 1090.
 — ipecacuanhæ, 1091.
 — kramerizæ, 1092.
 — — et cocainæ, 1092.
 — morphinæ, 1092.
 — — et ipecacuanhæ,
 1092.
 — potassii chloratis,
 1092.
 — santonini, 1093.
 — sodii bicarbon-
 atis, 1093.
 — sulphuris, 1093.
 Tropacocaine, 1093.
 — hydrochloride, 1093.
 Tropical bindweed, 179.
 — fruit laxative, 1169.
 Troy weight, 58.
 Trumpet plant, 219.
 Tuberculin, 932, 1094.
 Tuberculinum
 Kochi, 1094.
 Tuberoses triple
 extract, 1295.
 Tulip tree, 190.
 — — fluidextract, 190.
 Tully's mixture, iron
 and conium, 1217.
 Tulley's powder, 908.
 Tumenol, 1094.
 Tungstic acid, 320.
 Tungsten (element), 319.
 — combinations, 319.
 — compounds, 319.
 Tungstic acid, 320.
 — anhydride, 320.
 — dioxide, 320.
 Tungstic chloride, 320.
 Turkey corn, 156.
 — — comp. syrup, 1021.
 — pea, 156.
 Turkish gum, 117.
 Turlington's
 balsam, 1154.
 Turmeric, 157.
 — coloring, 519.
 — tincture, 157.
 Turpentine,
 228, 851, 1028.
 — Canada, 228, 851, 1028.
 — Chian, 852.
 — etherate, 399.
 — Hungarian, 852.
 — liniment, 771.
 — — acetic, 771.
 — oil, 228, 844.
 — — emulsion, 639.
 — — rectified, 844.
 — ointment, 1108.
 — spirits of, 228.
 — Strasburg, 115, 852.
 — Venice, 852.
 Turpeth root, 231.
 Turpethum, 231.
 Tussilago, 231.
 Tussol, 434.
 Twaddell's hydro-
 meter, 72.
 Twigs, 112.
 Twin leaf, 184.
 — — fluidextract, 184.
 Two iodides elixir, 592.
 Type-metal, 253.

U

- Ulmus, 231.
 Ultramarine 248.
 Uncooked creams, 1350.
 Unfermented fruit
 juices, 1330.
 — grape juice, 1330.
 Unguenta—Ointments,
 1094.
 Unguentine, 1111.
 Unguentum, 1094.
 — acidi borici, 1095.
 — — carbolic, 1095.
 — — salicylici, 1095.
 — — tannici, 1095.
 — aconitinæ, 1095.
 — adipis lanæ, 1096.
 — atropinæ, 1096.
 — basilicum, 1097.
 — belladonnæ, 1097.
 — benzoini, 1097.
 — cantharidis, 1098.
 — cantharidum pro usu
 veterinaris, 1098.

- Unguentum capsici, 1098.
 — cetacei, 1099.
 — cereum, 1095, 1098.
 — chrysarobini, 1099.
 — cocainæ, 1099.
 — conii, 1099.
 — Credé, 455, 1111.
 — creosoti, 1099.
 — cresoti, 1099.
 — diachylon, 1100.
 — eucalypti, 1100.
 — gallæ, 1100.
 — — cum opio, 1100.
 — glycerini plumbi sub acetatis, 1100.
 — hamamelidis, 1100.
 — hydrargyri, 1101.
 — — ammoniati, 1101.
 — — compositum, 1102.
 — — dilutum, 1102.
 — — iodidi rubri, 1102.
 — — nitratis, 1102.
 — — — dilutum, 1103.
 — — oleatis, 1103.
 — — oxidi flava, 1103.
 — — rubri, 1104.
 — — subchloridi, 1104.
 — iodi, 1104.
 — iodoformi, 1105.
 — leniens, 1096.
 — paraffini, 1095, 1105.
 — phenolis, 1105.
 — picis liquidæ, 1105.
 — plumbi, 1106.
 — — acetatis, 1106.
 — — carbonatis, 1106.
 — — iodidi, 1106.
 — — tannici, 1106.
 — — potassii iodidi, 1106.
 — — resinæ, 1107.
 — — rosmarini comp., 1107.
 — simplex, 1094.
 — staphisagriæ, 1107.
 — stramonii, 1107.
 — sulphuris, 1108.
 — — iodidi, 1108.
 — tartari stibiati, 1108.
 — terebenthinæ, 1108.
 — veratrinæ, 1108.
 — zinci, 1109.
 — — oleatis, 1109.
 — — oxidi, 1109.
 — — stearatis, 1109.
 Unicorn, false, 178.
 — root, 122.
 Unit, heat, 78.
 Universal cement, 1375.
 Unofficial tinctures, 1086.
 Upper ten perfume, 1299.
 Uralium, 502.
 Uranite, 301.
 Uraninite, 320.
 Uranious salts, 320.
 Uranium (element), 320.
 — carbide, 321.
 — combinations, 320.
 — compounds, 320.
 — salts of, general, 320.
 — acetate, 320.
 — chlorides, 320.
 — oxides, 320.
 Uranyl nitrate, 321.
 — salts, 321.
 — sulphate, 321.
 Urapurgol, 737.
 Urea, 1111.
 — nitrate, 1111.
 Urechites
 suberecta, 231.
 Urethane, 644, 1111.
 Urethral sup-
 positories, 979.
 Uric acid, 1111.
 Uritone, 737.
 Uropherin, 284, 1111.
 Uropherin B., 1030.
 Uropherin S., 1030.
 Urotropin, 737, 1111.
 Urotropinum, 737.
 Ursin, 232.
 Ursone, 232.
 Urtica dioica, 231.
 Ustilago, 231.
 Uterine catholicon, 1249.
 — remedies and cath-
 olicons, 1249.
 — tablets or
 wafers, 1251.
 — tonic, 1249.
 Uva ursi, 232.
 — — fluidextract,
 232, 709.
 — — infusion, 754.
 Uvæ, 232.
 — passæ, 232.
 — ursi folia, 232.
 V
 Vaccine lymph, 932.
 Vaccinium crassi-
 folium, 232.
 — — fluidextract, 232.
 Vaginal suppositories,
 979.
 Valerates, 388.
 Valerene, 428.
 Valerian, 232.
 — elixir, 623.
 — fluidextract, 709.
 — oil, 845.
 Valerian root, 232.
 — — fluidextract, 232.
 — — tincture, 1081.
 — — ammoniated, 1082.
 — — etherial, 1082.
 Valeriana, 232.
 Valerianæ rhizoma, 232.
 Valerianates, 388.
 Valerianic acid, 232, 387.
 — — diamine, 232.
 — — ether, 645.
 Valeric acid, 1112.
 Validol, 232, 1112.
 — — camphorated, 1112.
 Vallet's mass, 808.
 Valyl, 232, 1112.
 Vanadates, 321.
 Vanadic acid, 321.
 Vanadium
 (element), 321.
 — combinations, 321.
 — compounds, 321.
 — chlorides, 321.
 — hair dye, 1279.
 — oxides, 321.
 — salts of, 321.
 Vanilla, 232.
 — caramels, 1349.
 — essence or
 extract, 1320.
 — extract,
 1297, 1321, 1322.
 — — concentrated, 1321.
 — — flavoring ext., 233.
 — — fluidextract, 1321.
 — — solution, 1304.
 — — syrup, 1339.
 — — tincture, 232, 1083.
 Vanillin, 233, 1112, 1302.
 — — and coumarin
 extract, 1322, 1323.
 Vanillinum, 1112.
 Vanishing cream,
 Imperial, 1269.
 — — Peerless, 1269.
 Vapor, water, 322.
 Vapores—Vapors, 1112.
 Vaporizine asthma
 remedy, 1150.
 Vaseline, 861.
 Vasicine, 119.
 Vegetable alkali, 412.
 — cathartic pills, 879.
 — drugs, 110.
 — healing balsam, 1154.
 — preparations, 112.
 — diarrhœa
 mixture, 1217.
 Velvet cream, 1267.
 Venetian red, 280.
 Venice turpentine, 852.

- Veratria, 215.
 Veratrin, 233.
 Veratrina, 1112.
 Veratrine, 233, 1112.
 — ointment, 1108.
 — oleate, 848.
 — sulphate, 1114.
 Veratrone, 233.
 Veratrum, 233.
 — fluidextract, 233, 709.
 — tincture, 233, 1083.
 — viride elixir, 623.
 — — tincture, 1083.
 — — — Norwood's, 1084.
 Verbascum, 233.
 Verbena, 233.
 — nettle-leaved, 233.
 — fluidextract, 233.
 Verbenin, 233.
 Vermifuges, 1253, 1255.
 — tea, 1255.
 — tonic, 1253.
 Vermouth, 1372.
 Veronal, 1114.
 — sodium, 1114.
 Veronica, 233.
 Vervain, 234.
 — blue, 234.
 — fluidextract, 234.
 Veterinary balls or masses, 1260.
 — liniment, 1214.
 — medicines, 1259.
 — ointment, 1228.
 — worm powder, 1263.
 Viburnin, 234.
 Viburnum comp., 1250.
 — — elixir, 623.
 — — Hayden's, 1250.
 — opulus, 234.
 — — fluidextract, 234, 710.
 — prunifolium, 234.
 — — fluidextract, 234, 710.
 — — elixir, 623.
 Vichy effervescent salt, 1191.
 — water solution, 1347.
 Vigor, hair, 1285.
 Vina—Wines, 1114.
 Vinagre Anglais, 338.
 — de colchique, 338.
 Vinagres Médicinaux, 336.
 Vinaigrettes, 1312.
 Vinegar, 333.
 — antiseptic, 336.
 — aromatic, 337, 1313.
 — belladonna, 339.
 Vinegar, bloodroot, 341.
 — camphor comp., 338.
 — camphorated, 337.
 — cantharides, 338.
 — cevadilla, 339.
 — cider, 334.
 — colchicum, 338.
 — digitalis, 339.
 — distilled, 346.
 — English, 338.
 — generator, 335.
 — ipecacuanha, 339.
 — lavender, 339.
 — lobelia, 339.
 — malt, 334.
 — Marseilles, 336.
 — mother of, 335.
 — of the four thieves, 336.
 — opium, 340.
 — — aromatic, 340.
 — — compound, 340.
 — proof, 336.
 — prophylactic, 336.
 — pure food laws, 336.
 — pyroligneous, 346.
 — radical, 346.
 — raspberry, 341.
 — roses, 340.
 — rosemary, 339.
 — rue, 339.
 — squill, 341.
 — tests of, 336.
 — wine, 334.
 — with carbolic acid, 339.
 — wood, 346.
 Vinegars, 333.
 — medicated, 336.
 — — general formula, 336.
 — toilet, 1313.
 Vinopyrine, 866.
 Vinum album, 1114.
 — antimoniale, 1115.
 — antimonii, 1115.
 — aromaticum, 1115.
 — aurantii, 1115.
 — — detannatum, 1115.
 — camphoratum, 1116.
 — Chinæ, 1116.
 — cocæ, 1116.
 — colchici, 1116.
 — — seminis, 1117.
 — condurango, 1117.
 — ergotæ, 1117.
 — ferri, 1117.
 — — amarum, 1118.
 — — citratis, 1118.
 — ipecacuanhæ, 1118.
 — opii, 1118.
 Vinum pepsini, 1119.
 — quiniæ, 1119.
 — rubrum, 1120.
 — xericum, 1120.
 — — detannatum, 1120.
 Viola, 234.
 — pedata, 234.
 — tricolor, 234.
 — — fluidextract, 234.
 Violet, 234.
 — anilines, 430.
 — artificial, 1301.
 — dog, 165.
 — essence or ext., 1320.
 — extract, 1297.
 — mouth water, 1276.
 — perfume, 1299.
 — sachet, 1310.
 — syrup, 234.
 — toilet powder, 1271.
 — triple extract, 1296.
 — water, 1309.
 Virginia creeper, 125.
 — snakeroot, 223.
 — — fluidextract, 223.
 — stone-crop, 203.
 — — fluidextract, 203.
 Virginian prune bark, 209.
 — syrup, 996.
 — — tincture, 1072.
 Viscin, 205.
 Vitalized oil, 1225.
 — wine, 1126, 1252.
 Vitalizer, 1285.
 Vitellus, 234.
 Vitriol, white, 1128.
 — blue, 272, 530.
 Volatile alkali, 250.
 — liniment, 767.
 — oil of mustard, 843.
 — oils, 831.
 — — official, 833.
 Volatilization, 94.
 Vulnerary spirit, 968.
 W
 Wachsalbe, 1098.
 Wafer ash bark, 209.
 — — fluidextract, 209.
 Wafers, 480.
 Wahoo, 165.
 — bark, 165.
 — bitters, 1156.
 — fluidextract, 165, 692.
 Wake-robin, 130.
 Walnut creams, 1350.
 — hair oil, 1282.
 Walpole's hypo-bromic compound, 1145.
 Warming plaster, 630.

- Wash, black, 801.
 — hair, 1287.
 — yellow, 801.
 Washed sulphur, 314, 975.
 Washing crystal, 1382.
 — powder, 1382.
 Water, 321, 440.
 — ammonia, 441, 772.
 — — stronger, 442, 772.
 — anise, 443.
 — as ice, 322.
 — as steam, 322.
 — avens, 172.
 — — fluidextract, 172.
 — baryta, 256.
 — bitter almond, 443.
 — boiling point, 322.
 — camphor, 444.
 — caraway, 445.
 — chemical com-
 position, 322.
 — cherry laurel, 448.
 — chlorine, 777.
 — chloroform, 445.
 — cinnamon, 446.
 — creosote, 446.
 — distilled, 441.
 — dill, 443.
 — elder-flower, 451.
 — fennel, 199, 447.
 — — fluidextract, 199.
 — freezing point, 322.
 — Goulard's, 790.
 — hair, 1279.
 — hamamelis, 447.
 — lime, 444, 775.
 — lime, stronger, 636.
 — of crystallization, 322.
 — orange-flower, 443.
 — — — stronger, 443.
 — — — triple, 444.
 — — pepper, 208.
 — — fluidextract, 208.
 — peppermint, 449.
 — plantain, 123.
 — — fluidextract, 123.
 — proof glue, 1376.
 — pimento, 450.
 — rose, 451.
 — — stronger, 451.
 — vapor, 322.
 — violet, 1309.
 — spearmint, 450.
 — weight of, 322.
 Watermelon seed, 203.
 Waters, aromatic, 438.
 — eye, 1193.
 — medicated, 438.
 — — preparation of, 438.
 — mineral, 1345.
 — mouth, 1276.
 Waters, toilet, 1307, 1313.
 Wax, carnauba, 146.
 — bay, 146.
 — earth, 146.
 — Japan, 146.
 — mineral, 146.
 — palm, 146.
 — moustache, 1283.
 — myrtle, 146, 197.
 — paraffin, 147.
 — white, 146, 493.
 — yellow, 146, 493.
 Waxes, 493.
 Weight, atomic, 238.
 — molecular, 238.
 — specific, 70.
 Weights and Measures,
 57.
 — — early history, 57.
 — atomic, table of, 239.
 White fraxinella, 159.
 — hellebore, 178.
 — ink, 1392.
 — lead, 890.
 — oak, 211.
 — — bark, 211.
 — — — fluidextract,
 211, 702.
 — of egg, 122, 201.
 — petrolatum, 862.
 — pine, 207.
 — — fluidextract, 207.
 — — expectorant, 1181.
 — — pitch, 887.
 — pond lily, 199.
 — — fluidextract, 199.
 — poplar, 208.
 — precipitate, 289, 709.
 — — ointment, 1101.
 — rose cologne, 1309.
 — rose perfume, 1299.
 — vitriol, 1128.
 — wine, 1360.
 — — artificial, 1362.
 Whitewood, 229.
 Whiting, 485.
 Whisky, 964.
 — artificial, 1359.
 — cocktail, 1368.
 — essences, 1359.
 — Scotch and
 Irish, 1359.
 Wild allspice, 189.
 — basil, 210.
 — — fluidextract, 210.
 — cherry, 209.
 — — fluidextract,
 209, 701.
 — — and iron wine,
 1126.
 — — bitters, 1367.
 Wild cherry bitters
 extract, 1367.
 — — — Harter's, 1244.
 — — comp. elixir, 625.
 — — elixir, 624.
 — — — detannated, 624.
 — — — ferrated, 624.
 — — — ferri phos-
 phated, 624.
 — — infusion, 752.
 — — syrup, 996.
 — — tincture, 1072.
 — — wine, 1126.
 — ginger, 131.
 — — fluidextract,
 131, 1297.
 — hyssop, 234.
 — indigo, 135.
 — — fluidextract, 135.
 — ipecac, 166.
 — lettuce, 187.
 — — fluidextract, 187.
 — marjoram, 200.
 — olive perfume, 1299.
 — rosemary, 188.
 — — fluidextract, 188.
 — succory, 216.
 — turnip, 130.
 — — fluidextract, 130.
 — yam, 160.
 Willow, 216.
 — fluidextract, 216.
 — herb, 163.
 — — fluidextract, 163.
 Wine, antimony, 1115.
 — apple, 1362.
 — aromatic, 1115, 1121.
 — beef, 1121.
 — — and iron, 1121.
 — — — and cin-
 chona, 1122.
 — camphor, 1116.
 — calisaya or cin-
 chona, 1123.
 — — iron and stry-
 chine, 1123.
 — cascara sagrada, 1123.
 — cinchona and iron,
 1122.
 — coca, 1116, 1251.
 — — or erythroxy-
 lon, 1123.
 — — with beef, 1124.
 — cocktails, 1368.
 — cod liver oil, 1251.
 — colchicum corm, 1116.
 — — seed, 1117.
 — condurango, 1117.
 — cotton root, 1124.
 — damiana or
 turneria, 1124.

Wine, ergot, 1117.
 — essences, 1363.
 — gossypium, 1024.
 — ipecac, 1118.
 — iron, 1117, 1124.
 — — bitter, 1118, 1122.
 — — citrate, 1118.
 — kola, 1252.
 — opium, 1118.
 — orange, 1115.
 — — detannated, 1115.
 — pancreatin, 1125.
 — pepsin, 1119, 1125.
 — — and iron, 1126.
 — prepared, 1120, 1365.
 — quinine, 1116, 1119.
 — — improved, 1120.
 — red, 1120.
 — — artificial, 1363.
 — sherry, 1120.
 — — detannated, 1120.
 — spirits of, 403.
 — syrups, 1340.
 — tar, 1126.
 — vinegar, 334.
 — vitalized, 1126, 1252.
 — white, 1114, 1360.
 — — artificial, 1362.
 — wild cherry, 1126.
 — — — and iron, 1126.
 Wines and Cordials,
 1360—1368.
 Wines, 1360.
 — artificial, 1362.
 — high, 403.
 — improvement in, 1361.
 — low, 403.
 — medicinal, 1251.
 — red, 1361.
 Wintera, 234.
 Wintera cortex, 234.
 Wintergreen, 171, 1303.
 — berries, 171.
 — essence, 171, 964, 1318.
 — — soluble, 1328.
 — fluidextract, 171.
 — oil, 171, 838.
 — — artificial, 811.
 — syrup, 1340.
 Winter's bark, 234.
 — — fluidextract, 235.
 Witch hazel, 177.
 — — distilled ext., 177.
 — — fluidext., 177, 695.
 — — liquid extract, 177.
 — — oil, 1225.
 — — ointment, 1229.
 — — tincture, 1058.
 Witherite, 256.
 Wizard balm or oil, 1152.
 — liniment, 1211.

Wolframium, 319.
 (element), 319.
 Women's health res-
 torative, 1198.
 Wonder liniment, 1214.
 Wood alcohol, 410.
 — — Food and Drugs
 Act, 410.
 — betony, 136.
 — — fluidextract, 136.
 — charcoal, 265, 491.
 — naphtha, 410, 968.
 — oil, 134.
 — spirit, 968.
 — tea, 957.
 Woods, 112.
 Wool-fat, 392.
 — — hydrous, 392.
 Woorara, 175.
 Working formulæ, 327.
 — processes, 81.
 Worm killer, 1253.
 — lozenges, 1254.
 — medicines, 1253, 1256.
 — powder, veter-
 inary, 1263.
 — syrup, standard, 1253.
 Wormseed, 148.
 — American, 148.
 — — fluidextract, 148.
 — Levant, 218.
 — oil, 837.
 Wormwood, 116.
 — Alpine, 130.
 — compound, 1034.
 — essence, 1318.
 — Mexican, 130.
 — Roman, 116.
 — salt of, 117.
 — tincture, 1034.
 Wrinkle lotion, 1292.
 Writing inks, 1387, 1391.

X

Xanthium, 235.
 — spinosum, 235.
 Xanthorrhiza, 235.
 Xanthoxylin, 235, 921.
 Xanthoxylum, 235.
 Xenon (element), 322.
 Xeroform, 1127.
 Xylene, 888.
 — or ethyl benzene, 464.

Y

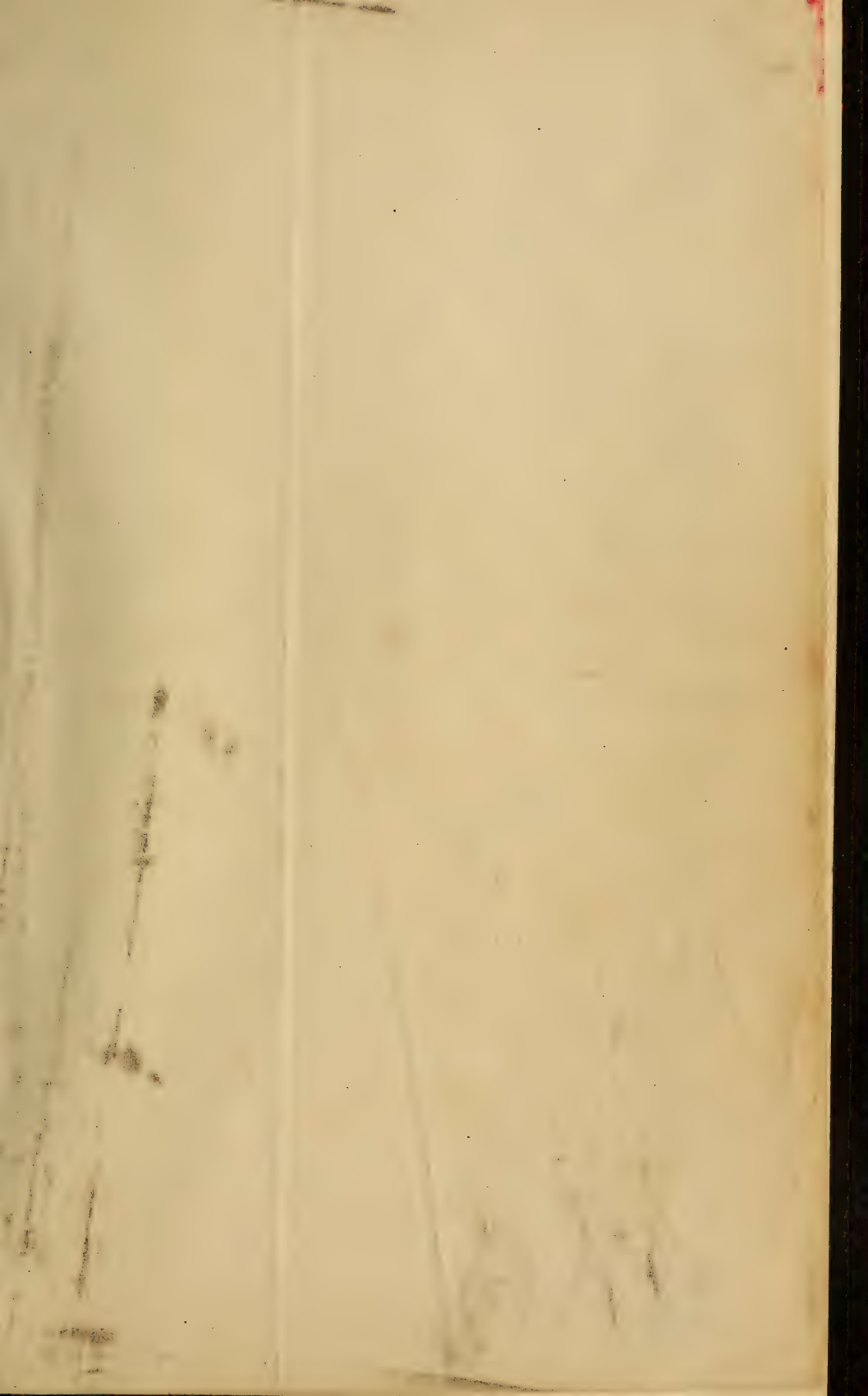
Yam, wild, 160.
 Yarrow, 118.
 Yeast, 167.
 — Vienna, 167.
 — compressed, 167.
 Yellow aniline, 430.
 — dock comp.

Yellow dock
 syrup, 1023.
 — fustic, 519.
 — iodide of
 mercury, 742.
 — jasmine, 171, 582.
 — — tincture, 1056.
 — lemon, 519.
 — mercurial lotion, 801.
 — mercuric oxide
 ointment, 1003.
 — oxide of mercury, 744.
 — parilla, 194.
 — pond lily, 198.
 — root, 235.
 — — fluidextract, 235.
 — wash, 801.
 Yerba buena, 196.
 — — fluidextract, 196.
 — mansa, 127.
 — reuma, 169.
 — — fluidextract, 169.
 — santa, 164.
 — — fluidextract,
 164, 692.
 — — comp. elixir, 625.
 — — — syrup, 1023.
 — — — glycerite, 733.
 — — elixir, 625.
 — — tincture, 1084.
 Ylang-ylang essence,
 1296.
 — — sachet, 1310.
 Yohimbe, 235.
 — compound, 1148.
 — fluidextract, 235.
 Yohimbetol, 235.
 Yohimbine hydro-
 chloride, 235.
 Yolk of egg, 234.
 — — glycerite, 732.
 Youth, bloom of, 1266.
 Ytterbium
 (element), 322.
 — combinations, 322.
 — salts of, 322.
 Yttrium (element), 323.
 — combinations, 323.

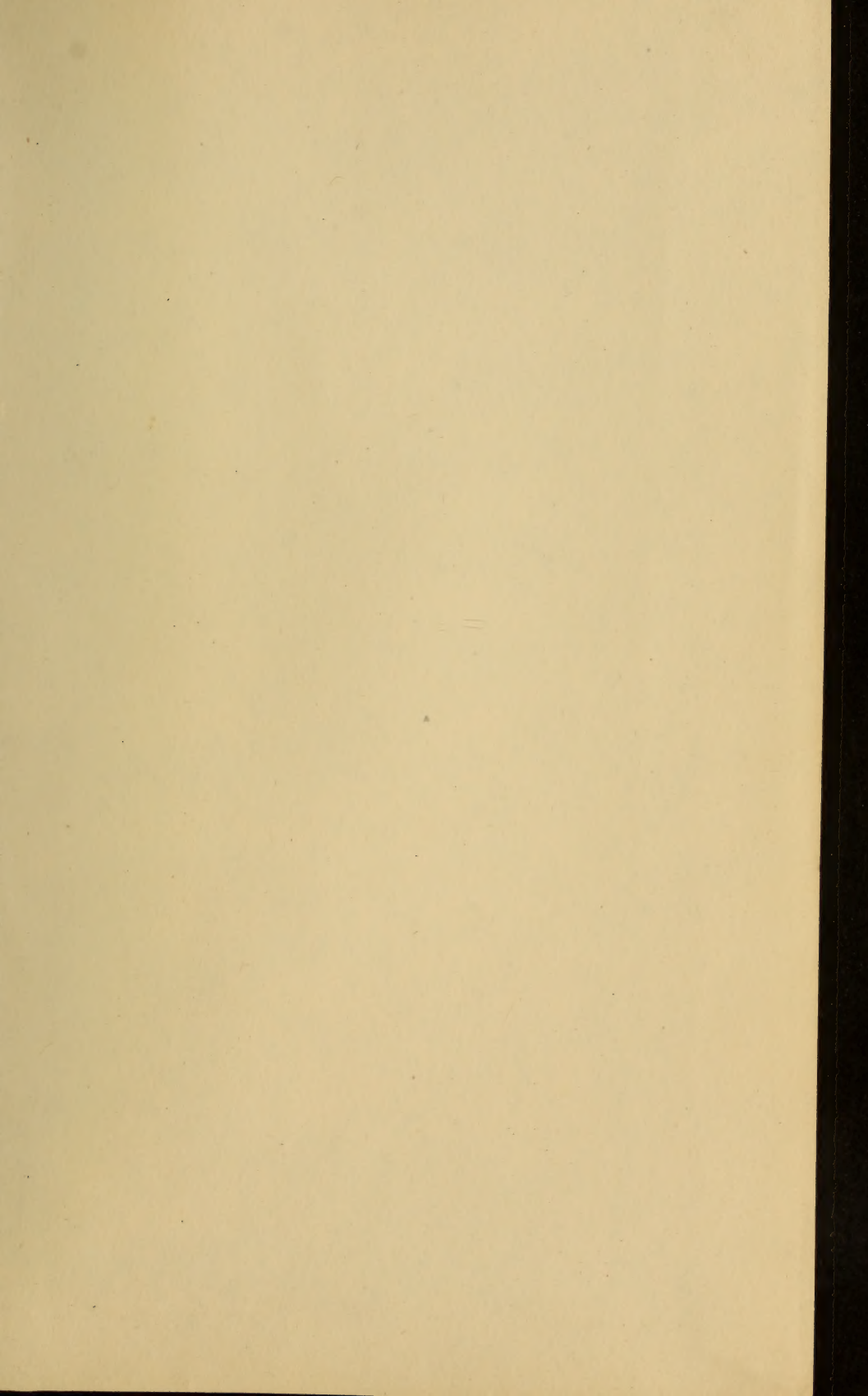
Z

Zea, 235.
 — mays, 235.
 Zeodoaria, 235.
 Zeodary, 235.
 — fluidextract, 236.
 Zero periodic group, 254.
 Zinc, 1127.
 — (element), 323.
 — acetate, 1128.
 — alloys, 323.
 — bromide, 1128.

- | | | |
|--|--|---|
| <p>Zinc carbonate, precipitated, 1129.</p> <p>— chloride, 1129.</p> <p>— — solution, 797.</p> <p>— combinations, 323.</p> <p>— etherate, 399.</p> <p>— granulated, 1127.</p> <p>— iodide, 1130.</p> <p>— metallic, 323.</p> <p>— oleate ointment, 1109.</p> <p>— oxide, 1130.</p> <p>— — ointment, 1109.</p> <p>— phenolsulphonate, 1131.</p> <p>— phosphide, 1131.</p> <p>— salts of, general, 323.</p> <p>— stearate, 1109, 1131.</p> <p>— sulphate, 1131.</p> | <p>Zinc sulphocarbolate, 1131.</p> <p>— valerate, 1132.</p> <p>— valerianate, 1132.</p> <p>— — elixir, 626.</p> <p>Zinci acetate, 1128.</p> <p>— bromidum, 1128.</p> <p>— carbonas præcipitatus, 1129.</p> <p>— chloridum, 1129.</p> <p>— iodidum, 1130.</p> <p>— oxidum, 1130.</p> <p>— phenolsulphonas, 1131.</p> <p>— phosphidum, 1131.</p> <p>— stearas, 1131.</p> <p>— sulphas, 1131.</p> <p>— valeras, 1132.</p> | <p>Zinci valerianas, 1132.</p> <p>Zincum, 1127.</p> <p>— granulatum, 1127.</p> <p>Zingiber, 236.</p> <p>Zircon, 325.</p> <p>Zirconium (element), 325.</p> <p>— carbide, 326.</p> <p>— chloride, 326.</p> <p>— combinations, 325.</p> <p>— compounds, 326.</p> <p>— hydrate, 326.</p> <p>— nitrate, 326.</p> <p>— sulphate, 326.</p> <p>— salts of, 326.</p> <p>Zivetha, 151.</p> <p>Zomakyne, 1143.</p> |
|--|--|---|



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